AIR Pictorial and AIR RESERVE GAZETTE

FEBRUARY, 1956

The INTERNATIONAL AVIATION ENTHUSIASTS' Monthly

1/6

Vol. XVIII No. 2

GOOD COMPANIONS. Flying men are individualists — who work together. To be of their company is to have as your friends the most dependable men in the world.

Flying plus...

variety, interest and satisfaction

In the Royal Air Force today, the adventure of flight is only one aspect of a steady, responsible career that can see a man through a long working life. Unlike most civilian jobs, it's a career that manages to satisfy both a young man's desire for action and accomplishment, and his later need for independence and security. And what a full life it is.

As a pilot or a navigator, you're concerned with many more things than taking an aircraft through the sound barrier. You'll be responsible for other people, too, and even perhaps for part of our future history.

Almost certainly, you'll serve abroad, enjoying all the opportunities open to an officer in the Air Force. But remember this — the R.A.F. wants men who can think for themselves and for others. This job demands brains and personality. If you have these qualities and can develop them further, fast, a R.A.F. career offers the chance of a lifetime. It brings more rewards in good living (and good fellowship) than you'll find anywhere outside the service — and it brings them while you're young.

Here is a great opportunity. If you are between the ages of 17½ and 26, if you're absolutely fit, and if you've passed G.C.E., S.L.C. (or their equivalents), ask yourself this question : "Have I got the other qualities it takes to live this flying life to the full?" If the answer is yes, act now.

HOW TO FLY WITH THE R.A.F.

You can now be granted a Direct Commission as pilot or navigator for a limited period or for service right up to pension age. There are further details of these two schemes in Air Ministry publications, that are yours for the asking. Write for them, stating date of birth and educational qualifications, to the Air Ministry (G.R.301a), Adastral House, London, W.C.1. Write today.

RESPONSIBILITY. Here, a navigator is trained in radar. He may be asked to take other men and a valuable machine across the world. He must know his job. He will have the most modern machinery to help him.

AND RELAXATION. The sporting life that revolves round a R.A.F. officers mess offers unusual opportunities. Gliding, winter sports, ice-yachting — these are a few of the privileged pastimes that come within your means.

The Royal Air Force *Flying ...and a career*

Editor:
FRANK HILLIER

AIR Pictorial and AIR RESERVE GAZETTE

Proprietors:
AIR LEAGUE OF THE BRITISH EMPIRE
LONDONDERRY HOUSE, 19 PARK LANE, LONDON, W.1.

Editorial Offices:
19 PARK LANE, LONDON, W.1
Telephone:
GROsvenor 1530 and 1382

Advertisement Manager:
Derek Merson
2 BREAMS BUILDINGS
LONDON, E.C.4
Telephone: HOLborn 5708

Vol. XVIII FEBRUARY 1956 No. 2

Perspective on Aircraft Production

IN discussing matters of great moment, particularly where comparisons are involved, it is essential to keep the issues in perspective. During the last twelve months, disappointments which have been encountered in respect of the performance and prospects of certain British aircraft have resulted in the growth of a measure of criticism, much of it of a querulous nature, and which has undoubtedly had some effect on public opinion and particularly as taxpayers who, in the final analysis, have always to foot the bill in cases of failure as well as of successes. Stories of failure never lose anything in the telling, and when political issues are involved, as they are in this particular matter, failures tend to be magnified at the expense of successes.

Elsewhere in this issue appears an article which, alongside the disappointments which have figured in British aircraft production in the last few years, sets forth the experiences of the American aircraft industry and the fighting services in regard to the same kind of aircraft. It involves no reflection on American designers or manufacturers to dwell on the infinitely greater losses which have been sustained in connection with the design and production of fighting aircraft in the United States since the end of the last war.

What emerges from what has happened on both sides of the Atlantic is that both designers and manufacturers have been impelled to set their sights higher than prudence and their own professional instinct would have dictated, because of the insistence of Air Staffs on the rapid production of aircraft of extreme performance. The results are only what could be expected. Where the Americans have scored is that having had so much greater financial resources and having consequently been in a position to launch so many more projects, the final results are in many respects in advance of what it has been possible to achieve in this country. It is largely for this reason that the current equipment of the United States Air Force is in many respects so much in advance of that possessed by the Royal Air Force.

It therefore becomes of the greatest importance to see that specification, design and production of aircraft in this country, and particularly of military aircraft, are organised on a basis which reduces to a minimum all and any possibilities of disappointment or delay. There are many highly qualified authorities who feel that this regime does not at present exist, and from the many suggestions which have been put before the Air League, some emerge as appearing to merit particularly close consideration. The closest possible association of selected Service pilots—and by this is meant not necessarily test pilots but fighter and bomber pilots and technical officers—with new projects from the earliest stage has been suggested and that these pilots should fly the aircraft at the same time as they are being flown by the manufacturers and Ministry of Supply test pilots, and there seems good reason to believe that the adoption of this practice would greatly reduce delays due to modifications at later stages.

The interposition of the Ministry of Supply between the customer and the manufacturer has recently come in for much criticism. It is clear that some department must exercise at least some sort of regulating function in regard to the allocation of production resources, particularly where there are two, and when there may be three, fighting services having urgent requirements. Some kind of arbitration would be clearly necessary. It seems also that whatever regime is ultimately adopted, care must be taken to avoid duplication of research work. It might be, therefore, that the transfer to the Ministry of Defence of responsibility for allocation of production, research remaining under the auspices of the Ministry of Supply, and that direct contact should be established between the Services and civil operators and manufacturers would be a solution worthy of close examination.

No one would pretend, least of all its own members, that the aircraft industry wears in all respects a halo of perfection; no industry would ever make such a claim. On the other hand there can be no doubt whatever that for years, advice from the industry on many important matters essential to rapid and economical production has been consistently ignored. It is only necessary to remember for example how long it took the Ministry of Supply to do what it had been urged for years to do and place orders for sufficient prototypes to enable test and development to proceed at the maximum pace.

Thus far this article has been concerned mainly with military aircraft, but equally important matters arise on the civil side and they are all the more important because, as the rearmament programme tails off, the problem will arise of maintaining the aircraft industry with its highly skilled labour and closely integrated design teams, at full strength and efficiency. This is absolutely vital to any prospects of an adequate defence organisation. Therefore it is clearly urgent that consideration should be given at the highest Government level to the organisation of adequate markets—and an adequate home market cannot be secured without Royal Air Force and Commonwealth participation—of all categories of large transport aircraft. The aircraft industry itself will no doubt readily recognise the possibilities presented by the markets in the Dominions and Colonial Empire, and indeed in all undeveloped countries, for lighter categories of aircraft, not only for such work as crop spraying, pest control, survey and bush flying, but for the high performance business aircraft for which there is increasing demand all over the world.

THIS MONTH'S COVER

THIS Martin Mariner is being used to test the practicality of the hydro-ski for large seaplanes. The ski absorbs landing shocks better than the conventional vee-bottom hull.

AIRCRAFT THAT FAIL

"FIASCOS" DO NOT ONLY HAPPEN HERE

By JOHN W. R. TAYLOR

IN the past few years, the fine record of achievement by Britain's aircraft industry has been marred by a number of costly disappointments and setbacks. These have provoked criticism of our designers and manufacturers; and the area of blame has spread to all the Government departments associated with the development of new aircraft.

There has certainly been far too much official indecision, and many wrong decisions, in cases where more careful study and clearer direction would have cut our losses in both vital development time and public money. But this must be kept in perspective.

Britain is by no means the only country where designers' hopes have not always been realised, and where Government Departments have made mistakes. In an age when the demands of Air Staffs for ever greater speed and ever more powerful armament increase at a feverish rate, design offices and factories all over the world are suffering from undigested progress. They are often asked to translate theoretical possibilities into what the industry calls ironmongery at a rate which is bound to lead to troubles in the air. The extent of these troubles, and consequent loss, has been considerable in this country; but it pales into insignificance beside what has taken place in the United States, where the whole scale of aviation activity is so much greater.

It is simple to illustrate the immense financial and technological cost of the progress needed to produce the ultra-advanced aircraft of today by recalling the stories of the Sopwith Pup and Convair F-102A—both among the best single-seat fighters of their kind.

It is more than forty years since the Sopwith Pup was designed full-size in chalk on the walls and floor of an ex-skating rink at Kingston. And works managers no longer walk along to the stores to choose a piece of material that looks about right for a spar or longeron. So we can hardly expect to get a 1956 fighter for the £1,390 that bought a Pup.

Nor does a designer automatically improve the performance of an aeroplane any longer by simply putting in a bigger engine. The Convair F-102 delta-wing interceptor proved this point. With a 10,000-lb. thrust J57 turbojet and afterburner, it should have romped past Mach 1. Instead, its pilots discovered that the sound-barrier was no misnomer; until one day somebody decided to give the aircraft a wasp waist and—hey presto!—another level-flight supersonic fighter joined the U.S.A.F.

Simple? Yes—but it would be an eye-opener to most of those not directly engaged in aircraft production to learn how costly was the research programme by the N.A.C.A. and Convair that produced the American version of the area rule concept and the F-102's wasp waist. It is too often assumed that it is only in this country that money is spent on aircraft that are stillborn or that die young as prototypes; and that some superior intelligence enables American and Russian designers to avoid the troubles that hold up the introduction into service of certain British aircraft.

So far as the Soviet Air Force is concerned, we see and hear about only those types of aircraft that are successful. It appears that Russia concentrates on producing only one day fighter, one all-weather fighter, one light, one medium, and one heavy bomber at a time. Thus the MiG-15 was succeeded by the MiG-17, which in turn is giving way to the new fighter we know as Farmer. These types must have been chosen for service after competitive trials against other prototypes at a Soviet "Boscombe Down", far behind the Urals.

The men, aircraft and equipment needed to enable one man—Major Charles Yeager—to fly the Bell X-1A research aircraft.

In Britain, on the other hand, we parade at Farnborough each year not only our most successful aircraft, but others which will never be more than development prototypes.

As for the Americans, they would be the last to deny that they have had costly setbacks.

Only a few days before this article was written, one of the prototypes of the 600-m.p.h. Martin Seamaster flying-boat blew up in the air, killing its crew. A similar accident befell a Convair Sea Dart water-based fighter over San Diego Bay, in front of a crowd of high-ranking naval officers and pressmen. Herman Salmon had to abandon a prototype of the much-vaunted Lockheed F-104 when it got into difficulties. Even that superb fighter, the F-100 Super Sabre, had to be grounded after three pilots were killed.

As it is one of the most important weapons in America's armoury, no expense was spared in tracing the reason for the accidents. After 3,000 hours of scientific detective work as painstaking as our own Comet inquiry, a cause was found and another battle won against the still unfamiliar forces encountered in flight at high speeds. With a larger fin and other changes, the F-100s are flying again, so successfully that one set up the first supersonic speed record of 822 m.p.h.

To speed victory over the unknown, tens of millions of pounds are being spent all over the world on research aircraft, of no direct commercial or military value beyond the data they bring back from every flight. Yet even these aircraft crash, although they are specially built for the job, with no concessions to payload, endurance, or, in the case of U.S. machines, ability to take off without the assistance of a mother-plane.

In Britain, all three of the D.H.108s, the original Avro 707, the H.P.88 and the Boulton Paul P.120 were lost. In America, two of the rocket-powered Bell X-1 series have been destroyed after fires or explosions whilst they were still attached to their mother-planes. One of the Bell X-5s crashed, and the stub-winged Douglas X-3, built at high cost for flight at up to Mach 3, has been more or less

abandoned, as its performance potential proved to be not worth the extreme difficulty and danger of flying it.

The X-3's troubles can be traced to one of America's most expensive failures—the Westinghouse J40 and J46 turbojets, that were to have powered the X-3 and several of the U.S. Navy's most important new bombers and fighters. In an effort to save the day, Westinghouse signed a technical tie-up with Rolls-Royce: but it was too late to avoid disruption of almost the entire U.S. Navy re-equipment programme, because the McDonnell Demon, Douglas Skyray and Skywarrior were all intended to be powered by the J40. and th Chance Vought Cutlass by the J46.

The seriousness of the resulting changes of plan was indicated in the December 1955 issue of *Air Pictorial* (page 388) in an account of the House of Representatives' investigation into the troubles of the Demon. It is every bit as disturbing as anything that has happened in this country, showing that five of the original F3H-1s crashed, four are flying with other engines, and twenty-one may be used only for ground training—a total estimated loss of £71 million.

Yet that is only a small part of the story. The Demon has had to be re-engined with the Allison J71 turbojet. The Skyray and Skywarrior both had to be adapted to take Pratt & Whitney J57 turbojets, which held up squadron delivery of production aircraft until three or four years after the prototypes flew. The A2U-1 version of the Cutlass had to be abandoned completely. Production F7U-3 Cutlasses were flown with J35 turbojets of inadequate power until some of the troubles of the J46 had been cured.

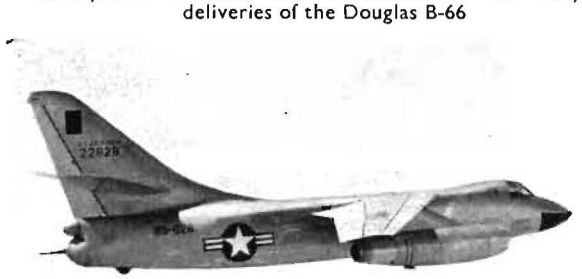
Nor did all America's troubles stem from turbojet shortcomings. Delivery of the Douglas B-66 has been delayed by aerodynamic troubles. The F-84F Thunderstreak was held up for four years by a succession of false economies, engine changes and essential redesigning. After two crashes and continuous trouble with its Allison T40 coupled turboprop, the Douglas Skyshark was dropped except for a small batch of development aircraft. Even helicopters have had their setbacks. The Piasecki Workhorse had to be grounded for many months after a series of accidents, and aerodynamic problems are holding up development of the big twin-engined Sikorsky S-56. The much-publicised Lockheed XFV-1 Salmon experimental V.T.O. interceptor still has not taken off or landed vertically, although it is two years since it began operating on a "temporary" conventional wheeled undercarriage.

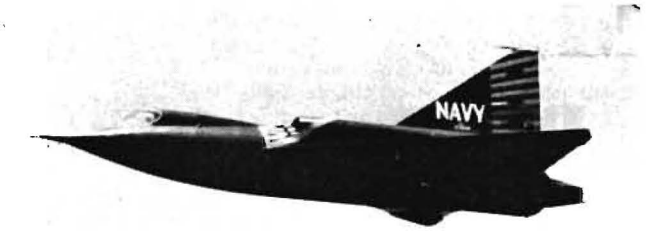
The cost of all these failures and production setbacks is fantastically high, even by American standards. The Demon's lost £71 million is a tiny fraction of the total, which could never have been borne by the economy of any country but the United States—or Russia.

Fortunately, by comparison, Britain has achieved wonders on the proverbial shoestring. Much of the credit is due to the immense achievements of our engine-makers, whose world leadership is shown by the fact that engines of British design power many of America's latest and best warplanes, and other aircraft throughout the world, not excluding Russia's MiG-15!

We can also be proud of the fact that the British Canberra is being built in America as the U.S.A.F.'s standard tactical bomber, and that the Viscount has been chosen by two major U.S. airlines—an unprecedented occurrence in the home of modern transport aircraft. And is it not significant that Bristol, Convair and Canadair are working as a team to develop a new world-beating transatlantic air liner, based on experience gained with the Britannia and using Bristol BE25 turboprops?

Aerodynamic troubles have contributed to the delay in deliveries of the Douglas B-66





The Convair Sea Dart disintegrated while making a high-speed pass over San Diego bay.

Nor has there been as much wastage of design effort as one might expect. The airframe of the unfortunate Tudor 2 transport was adapted into the valuable Ashton high-altitude research aircraft. The D.H.110, rejected by the R.A.F. after competitive trials against the Javelin, has been adopted by the Fleet Air Arm, and will be a very formidable all-weather carrier-based fighter.

Next of course, we have the Swift. For years this fighter promised to be as good or even better than the Hunter, which was having its share of teething troubles. Then it was realised that the aerodynamic troubles encountered with early marks of Swift were virtually incurable. Fortunately, by then, the Hunter had developed into a very fine interceptor—not entirely without snags, but, in the latest Mark 6 version, an ideal machine for daylight defence of these islands against the current operational types of our only potential enemies. So, whilst regrettable, the loss of the Swift Marks 1 to 4 was not vital.

What of our civil aircraft? It might have been better not to spend £6½ million of public money on the Brabazon and £1 million on the Shetland, and then abandon both. But we should not begrudge the £1¼ million paid for the Apollo, just because it was not so good as the incomparable Viscount. The Viscount *might* have proved a failure, and it is always a comfort to have an "insurance" in the shape of an alternative.

Nor can we regret the £4¼ million spent on the Comets 1, 2 and 3, which came so very near to giving Britain commanding leadership on the world's civil airways. The lessons learned by bitter experience with them will make air travel safer for millions of passengers in the years ahead.

As for the Princess flying-boat and the V.1000—the total of £10.3 million spent on them has been wasted by Ministerial vacillations, not by any shortcomings on behalf of their designers or constructors.

It is to be hoped that American jet-liners do not scoop the cream of transatlantic air traffic in due course, although should that happen it will be some consolation if, as seems most likely, some of them are powered by British Conway engines.

It is well to bear in mind that not all the money that is sunk in new aircraft comes out of the taxpayer's pocket. Only a few weeks ago, Sir Richard Fairey announced that his company spent £338,000 on the original Gyrodyne and £382,000 on the F.D.1. Fairey's also took a gamble to the extent of £539,500 on the Gannet. Handley Page have financed the Herald as a private venture to the extent of £2,250,000; Vickers are doing the same with the new Vanguard.

Similarly, the money spent on the Swift and other military types has bought experience that is giving us better defence and unrivalled atomic striking power which, side by side with the deterrent forces of our allies, may save us from the horrors of World War III.

The complex equipment that enables our warplanes of today to do their job is terribly expensive. The price of one Hunter would have bought nearly two squadrons of Hurricanes. A Vulcan costs as much as a dozen Lancasters.

We must remember the lesson of Korea, where U.S.A.F. Sabres won a 14 to 1 victory over MiG-15s through long months of war because no expense was spared to keep them as good as brilliant design and careful workmanship could make them.

The price of victory in the air in war, and of leadership in peace, is measured today in millions of pounds and, alas, in human lives. It is a high price to pay; but nothing worthwhile was ever achieved without sacrifice, and to lose faith and abandon progress would be a sad decision for a great country.

MACH 2 FIGHTERS . . . . . .

Problem of the Power Plants

By JAMES HAY STEVENS

The conclusion of Mach 2 fighters deals with the choice of power plant. Part 1 appeared in the January issue of "Air Pictorial."

IT should by now be obvious that the key to this problem lies in the choice of power plant. Here one can note a sharp divergence of expert opinion. There are three possible engines, the turbojet, the ramjet and the rocket: each has its virtues, and each its vices.*

The turbojet gives the lowest fuel consumption, but is beginning to droop above Mach 2. The heated air in the intake reduces the amount of fuel that can be burned without scorching the turbine. Power falls off with reduced air density and the practical limit for combustion is probably 70,000 ft.

The ramjet is much simpler and lighter than the turbojet, but has a much higher fuel consumption. Its power increases and its fuel consumption falls with supersonic speed and it has no turbine to overheat. Power falls with altitude, but it has a 10,000-ft. edge on the turbojet. It is not readily throttleable.

It can be combined with the turbojet as an **afterburner,** while either a turbojet or a rocket can be used to boost it for take-off—since it must have forward speed to start its cycle and it does not really get going until Mach 1.

The rocket is the lightest engine, though less simple than the ramjet, but has an enormous fuel consumption because it must supply its own oxygen (50 tons an hour is typical for a fighter rocket at full thrust). The paramount advantage is that power is completely independent of altitude.

The ramjet and rocket have a common secondary disadvantage in that they have no rotating shaft that can be tapped to provide accessory power. This is quite a serious matter, since their own high-capacity fuel pumps, together with the fighter's electrical requirements, will absorb several hundred horse-power.

The different engine characteristics produce a veritable maze of intersecting curves from which the designer must select. The probable form of interceptions has first to be established. This flight envelope will indicate how long climb power, Mach 2 power and cruise power will be needed. From this the designers will then juggle with the thrust, fuel weight and engine weight—maximum effort for minimum weight is here the watchword.

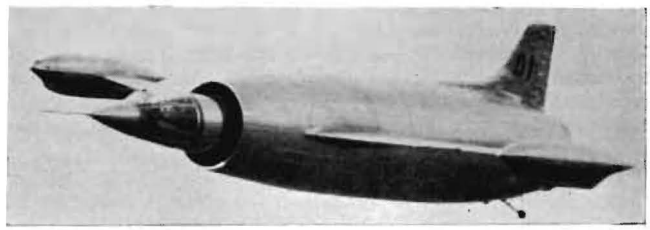
It is now generally accepted that some form of dual power is the answer. Exactly which combination is the subject of hot debate.

The contender with the greatest support seems to be the turbojet+rocket, but even here there is wide variation in approach.

One school considers the rocket to be the major power plant with the turbojet as an auxiliary. This can be exemplified by the S.N.C.A.S.O. Trident which, though not a Mach 2 fighter, is a logical, and not too expensive, step in that direction. Here, the two Armstrong Siddeley Vipers give some 3,300 p.s.t. at sea-level to assist take-off and provide an economical cruising thrust. The three-barrel SEPR nitric acid rocket delivers 10,000 pounds at full power. Since the rocket is the major power unit the Trident has a huge fuel-carrying fuselage; even so the maximum speed of Mach 1.6 can only be held for 4½ minutes.

Another school is that shown graphically by de Havilland in relation to the Gyron turbojet and the Spectre rocket. Here we have a powerful turbojet as the main power plant, which is boosted at the appropriate stages by a ramjet (afterburner) and a rocket. The idea here is to try and get the best out of all three "worlds": to use the relative economy of the turbojet whenever possible, to boost it, without a frontal-area penalty, when reheat is most efficient, and to use the rocket, again virtually without increasing frontal area, to maintain thrust where the atmospheric supply is failing. It is a wonderful example of technical teamwork, but it will give the pilot an additional headache to keep track of the various minutes of operation left of the three powers!

*See "Tomorrows Aero Engines", June, pp. 163-165.



The Leduc 021, a test vehicle for the 022 Mach 2 fighter, is being used for research at altitudes between 33,000 ft. and 66,000 ft. Initial rate of climb is 19,400 ft.-min.

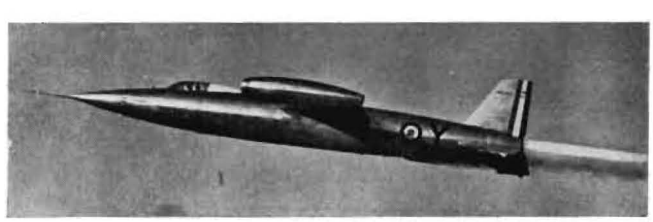
Even more than in the case of the Trident, the details of this scheme remain shrouded in secrecy, but one shred of quantitative data can be extracted. The Gyron was type-tested at the record figure of 15,000 p.s.t. To this one can reasonably add 40 per cent for the sea-level reheat power, making 21,000 p.s.t.—always supposing it is a single-engined fighter. For the special techniques incorporated in the Gyron, the reader is referred to pages 301 and 302 of the October 1955 *Air Pictorial.**

A third, perhaps lone, voice but certainly one deserving attention is that of M. René Leduc in support of the ramjet. The nearly-complete 022 fighter prototype is a dual-power aeroplane, for it has a 6,000-p.s.t. Atar turbojet at the rear of its central pilot nacelle. This is used for take-off and to accelerate to a speed where the main ramjet engine can take over—it also drives the accessories. The Leduc is an integrated aeroplane and engine which, in the 022 version, is credited with the equivalent of a sea-level thrust of 141,000 lb. at Mach 2! This figure is given as an indication of the potential of a large ramjet; it would be impractical to use the power, since it would require an enormous amount of fuel and the high pressure generated within the duct at low altitude would probably burst it.

M. Leduc anticipates a Mach 2 specific fuel consumption of less than 2.5 lb./lb. thrust/hr.—up to 30 to 1 pressure ratio is possible due to airspeed—compared with 1.5 for a turbojet or 16 lb. for a rocket. This ramjet is expected to maintain combustion up to 80,000 ft. and, according to its designer, is the *only* way of providing the excess power for supersonic climb, acceleration and manoeuvre, together with satisfactory interceptor endurance. This claim is based on the overall weight of power unit and fuel.

The Leduc 022 is the culmination of many years of painstaking work by the inventor and his sons. At this year's Paris Salon the 021 model was most impressive in flight, with its rapid acceleration and obviously clean combustion. It would seem to represent the simplest Mach 2 interceptor—yet it is a highly complex structure

Another approach to the Mach 2 fighter is the rocket-powered aircraft exemplified by the S.N.C.A.S.O. Trident, shown using one of its three SEPR rocket motors.



*Detail problems were also enlarged upon in "Britain's Turbine Research", December 1955, pp. 367-368.

(Continued on page 42)

Coanda Reappears

CURRENT interest in extracting higher lift co-efficients and shortening the take-off has re-introduced the almost forgotten term "Coanda effect". To most of the post-war generation—and indeed to many of the inter-war generation also—of the aeronautical fraternity this is an unknown expression. Yet what it describes is of great importance to the theory of flight.

First, however, a word about the origin, rather than the meaning. Monsieur Henri Coanda, who is alive and active today, was one of the French aviation pioneers of the early part of the century. Starting with gliders in 1905, he later experimented with his aerofoil theories by mounting test sections on a railway engine travelling at 60 m.p.h. At the 1910 Salon he showed an original aeroplane; cantilever wing, butterfly tail, full-span leading-edge slot and—a "turbo-propulseur"! This aeroplane did leave the ground, but the inventor insisted on piloting it himself, without experience, and it crashed and was never rebuilt. But all that is another story.

Monsieur Coanda, at a time when airflow theory was extremely embryonic had, with the aid of his own smoke tunnel and the railway tests, established the basic factors governing the flow of a fluid over a curved surface. These he had applied to his aeroplane's slotted wing and to the air "turbine" with which he had replaced the conventional airscrew.

Coanda effect is a particular application of the fact that any fast-flowing jet of fluid induces molecules from the surrounding stationary medium to follow it. They are sucked into the main stream, but if a solid body lies alongside the jet it impedes the induced flow of fluid particles and a semi-vacuum develops. If the body is free to move it is sucked toward the axis of the jet—in this one sees another aspect of the upper surface of a wing. If the body is fixed, then it is the jet which is deflected.

This can be simply demonstrated by holding a curved object against the flow from a tap. If you use the convex surface of a spoon, you will find it tends to be drawn into the flow if it is held lightly and to deflect the flow if held firmly. But to appreciate Coanda effect fully, a rolling-pin is ideal. When the tap flow and rolling-pin position are properly adjusted, the water will travel right round 90 deg. to the far side before being drawn off by gravity.

Of course, this is no more than the basic fact; its application involves much careful calculation and brings in critical conditions of fluid viscosity, boundary layer, and so on.

Power Steering

HYDRAULIC nosewheel steering is today a standard feature on airliners, but a new modification to the tailwheel of the DHC-3 Otter must be unique. Tailwheels are quite often coupled to the rudder to aid ground manoeuvring, but in all save the smallest aeroplanes they are either freed or locked for take-off and landing to prevent over-sensitivity.

The de Havilland Otter has large tail surfaces because it is a slow-flying aeroplane, and these surfaces naturally bring pronounced "weathercocking" tendencies in a cross wind. Under some taxying conditions the large rudder area causes a feedback to the pilot's rudder pedals which can be tiring. Another, peculiarly Canadian, problem is the need to be able to rock the tailwheel from the cockpit to break it free from ice after parking under winter conditions. In order to meet and overcome these difficulties, an electrical actuator has been incorporated in the rudder-pedal/tailwheel circuit. The actuator is sensitive to rudder pedal movements and translates them into an assisting torque force. A slip-clutch prevents the tailwheel from being overloaded and an electric clutch allows the unit to be disengaged from the cockpit when the pilot prefers a free castoring action.

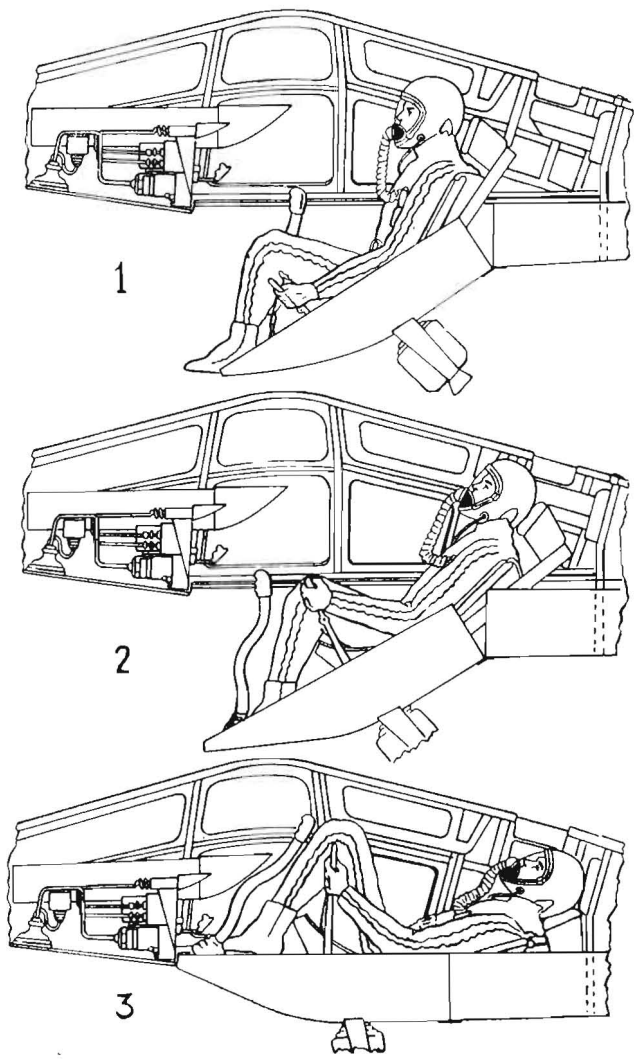
Capsule Ejection

SUPERSONIC ejection has been in the news recently with the stories of American and British pilots who have survived this desperate experience.

Actually, there are two distinct problems connected with survival from the modern fighting vehicle—high speed and high altitude. Together they form one of the trickiest military technological tasks, for not only is it a question of saving men's lives and of supporting the combat pilot's morale, it is also a blunt matter of military necessity—of saving personnel whose training has been both lengthy and expensive.

The G-suit and pressure suits are already familiar, while visitors to the last S.B.A.C. Display will remember the new survival suits of which details were strictly "Classified". These garments were like the space suits of science fiction, a species of diver's

(Continued on page 42)



Recently revealed by the U.S.A.F. is this escape capsule which was originally designed for the Convair F-102. After the ejection sequence is set into motion the pilot and seat are moved from an upright to a supine position. The pilot can then withstand the 12*g* ejection loads imposed on him when the capsule is fired from the aeroplane.

Technical Notes

(*Continued from page 41*)

outfit, and were cumbersome indeed. Such suits would solve the problem of keeping the pilot alive at great heights—above 50,000 ft. death is almost instantaneous without pressurization and even a free fall o lower levels is unlikely to save him—but not that of the battering of supersonic flight below, say, 20,000 ft.

It was originally thought that in the event of battle damage at high speed, the rapid break-up of the aeroplane would give equally rapid deceleration to a reasonable escape speed. What had been overlooked was the need to bale out because of system failures—a reason which increases with the aeroplane's complexity.

It has been obvious for some years that the only solution is some form of capsule. Yet this answer has been strenuously resisted by most aeroplane designers, because it entails more weight and yet another complication. The engineer already has a complicated task designing a pressurized cockpit, retaining a reasonably good view, squeezing all the many controls and instruments into the smallest possible space, and arranging the passage of the various "runs" through pressure seals.

Some publicity has already been given to American tests with a jettisonable cockpit, but the most business-like design yet revealed is one from the U.S.A.F. Wright Air Development Center. This device was developed for the Convair F-102 (although its principle is generally applicable) and the jettisonable capsule consists only of the upper part of the cockpit, the seat, the canopy, and the latter's rear fairing. The device has not yet been installed, but a working mock-up has been built to test the mechanism and wind-tunnel model tests have been carried out. Experimental firings from the supersonic rocket sled are to be made next summer. The canopy, the top of the instrument panel and the rear fairing form a pressure-tight box, with an opening in the bottom where the pilot sits.

The pilot's seat is mounted in a bath-like cowling which swings up and seals the canopy section when the ejection lever is pulled. The unit is then ejected from the aeroplane by a rocket; a 40-in. drogue chute next opens and slows it while a finned boom trims the motion. When the unit has decelerated to 190 m.p.h.—at or below 15,000 ft.—a 48-ft. parachute opens. The capsule is, naturally floatable, and contains a hand-crank radio and an exit hatch.

The designer, Mr. Anthony Mastriana of the W.A.D.C., has spent four years developing the capsule, which is said to add only 130 lb. weight to an aircraft. The present 12,000-lb. thrust rocket bottle contributes 43 lb. of this and an 8,000-lb. unit of 23 lb. weight is to be tried. The timing is interesting. The seat swings up in one-third of a second, the ejection rocket's duration is a quarter of a second and the drogue chute opens after six-tenths of a second.

As the seat swings up, the pilot is, of course, supine and therefore well able to withstand the 12*g* ejection loads. Deceleration, on the other hand, will apply 18*g* as if sitting, since the drogue is in the tail—which for the estimated three to ten seconds would be unhealthy indeed.

Fibreglass Fuselage

FIBREGLASS is not widely used for aircraft parts in this country, although it is popular in the U.S.A. In fact, one would be safe in saying that few British aircraft incorporate such parts save for radomes and other fairings that must be electronically "transparent". This is surprising, since it is strong, light and easily fabricated.

"Fibreglass" is classed as a plastic laminate. It consists of one or more layers of glass cloth, which looks like artificial silk—until you get a thread in your finger—impregnated with a synthetic resin that sets hard. The glass cloth gives grain and tensile strength, while the resin stabilises the material and gives form to the part. Manufacture is simple: the cloth is laid over a polished mould, or former, of the main or outer surface and then the resin is brushed in by hand, after which it can be dried in a few hours by infra-red lamps, or at room temperature in a day or so. Note that no pressure, ovens, or male-and-female dies are required, simply a former. The finish of the former affects that of the part and where a smooth surface is required the mould surface is usually made from—fibreglass!

The finished part is reliable in strength, has a good fatigue life, and stands up well to handling—which makes it particularly good for fairings. It has, of course, its snags, one of which is the high cost of the glass cloth. It is, however, a coming material and likely to be adopted more and more as knowledge of its handling techniques increases.

One of the latest applications is in the new Taylorcraft Topper. When painted, this high-wing monoplane looks as if it were of thick metal stressed-skin construction with its unwrinkled surface. In fact, it has a dual structure: the main fuselage load-carrying members are the typical Taylorcraft welded steel-tube framework. Over this, instead of the traditional fabric, is fitted a fibreglass shell, made in two halves joined down the centreline. The dual structure is claimed to be light and gives the best of two worlds—the ability of steel tubing to carry large loads and of fibreglass to resist rough handling.

In the Technical Note on the Rotol ram-air turbine (December, p. 378) there was a slip which, unfortunately, managed to elude the double check given to all proofs. The paragraph in the second column dealing with the pitch-change mechanism reverses the action—as if it were a propeller *instead of a turbine. The sentence concerned should read as follows:*

"*The torsion bars hold the blades in* fine *pitch until, as the airspeed increases the rotational speed of the windmill, centrifugal force on the flyweights throws them outward. The outward movement of the weights turns toothed segments which rotate the blades toward* coarse *pitch,* i.e. the lower r.p.m. position."

"*Boffin*" *offers his sincere apologies to those readers who were misled, and to Mr. D. J. Sparrow of Enfield, who spotted the slip immediately, his thanks.*

Mach 2 Fighters (*Continued from page 40*)

and the ramjet contains hundreds of fuel injectors as well as high-capacity turbo-pumps that have taken years to develop.

The Leduc 022 is probably the most imminent Mach 2 aeroplane, if one excepts the American experimental rocket planes.

This is but the barest outline of the problems of the Mach 2 interceptor—which may or may not be with the R.A.F. ten years from now. One would imagine that its design would tax the *entire* resources of one company—it might even require the collaboration of several companies to cover all the aerodynamic, structural and ancillary research and design—plus, of course, a large contribution from one or more engine companies.

Furthermore, the resulting vehicle will almost certainly be so complex that it will require squadron technical teams akin to the design staff of a small aeroplane company.

The reader may wonder why the Mach 2 fighter should give so much promise of trouble when missiles have been going that way for some years now. The answer lies principally in the weight of the load, which leads to a large vehicle, and the need to design for low speed and landing. Also, the fighter must be truly controllable; the simplified control systems of missiles result in a skidding, yawed flightpath like a badly-flown aeroplane.

It may also seem surprising that missiles could not be used anyway, since they have nearly ten years' start in development. The answer here is that, for another ten years yet their range is likely to be limited. (Wings are needed to support the weapon where range is extended and then one moves toward the unmanned fighter.) To distribute sufficient expendable missiles to form a complete screen round our island to meet a sustained attack would be incredibly expensive—the fighter carries (cheaper) missiles toward the target and so covers a greater area. Even so, it is inevitably a specialised, short-endurance vehicle.

Of course the Mach 2 fighter will itself be so expensive that no government is likely to be willing to buy more than the bare minimum. It might then be possible for the enemy to overcome the defence, not by a few fast red Hustlers, but by overwhelming it by large numbers of prosaic Bears and Badgers. . . .

Large serial numbers were a feature of R.C.A.F. training aircraft, and this Fleet Trainer used in the early 'thirties is no exception.

COMMONWEALTH MILITARY SERIALS

By Bruce Robertson

2. CANADA

THERE were so many Canadians serving in the Royal Flying Corps, Royal Naval Air Service and the Royal Air Force* during World War I, that the Canadian Government was dissuaded, as a matter of Imperial policy, from forming an Air Force of their own. Having in mind the future of aviation and the precedent of an Australian Flying Corps, Canadians naturally pressed for such a Force, but its establishment came too late for active service. A number of S.E.5A, Dolphin and D.H.9 aircraft were diverted from the R.A.F. in August 1918 to form, in Britain, a Canadian Air Force nucleus of two squadrons. The Armistice, however, led to its disbandment and the aircraft, which had retained their original serial numbers, were returned to the R.A.F. Although no separate Canadian flying unit took the field, the Dominion was represented by 172 aircraft bearing the inscription "CANADA"; these having been donated by Canadians.

In a training role, a part of the R.F.C./R.A.F.* was directly associated with the Dominion. This was the R.F.C. (Canada) training organisation set up early in 1917, consisting of Nos. 78 to 97 (Canadian) Reserve Squadrons of the R.F.C. An Imperial scheme administered from London, its object was to give flying training to the willing, indeed eager, manhood of Canada, in the wide open spaces conveniently available in their homeland. So closely was this project identified with Canada, that the Curtiss J.N.4 training aircraft supplied wholly from Canadian Industry, were not numbered in the R.F.C./R.A.F. range, but were appropriately given a new series. They were numbered consecutively from No. 1 with a "C" for "Canada" prefix. A total of 2,291 aircraft was delivered to this Force. The numbers had an unusual significance in that they were the only markings indicative of national identity, for no roundels, or other national insignia were carried, not even when two training wings moved into Texas during the winter of 1917–18.

The Royal Canadian Navy established its own Naval Air Service (R.C.N.A.S.) during this war. A small force, it consisted of twelve Curtiss HS-2L flying-boats presented by the U.S. Navy and eight ex-R.N.A.S. Sopwith Seaplanes which retained their original numbers—(Schneiders Nos. 3707, 3709, 3765 and 3806, Babies Nos. 8125, 8197, 8204 and 8209).

Canada is the only Dominion to have supplied the United Kingdom with military aircraft in quantity; production can be traced back to 1915 when twelve J.N.3 trainers were built by Curtiss in Toronto for the R.N.A.S. as Nos. 8392–8403. Built at the same works in 1916 was the Curtiss Twin-Canada, R.N.A.S. No. 3700, a remarkable machine with a boat-like fuselage. It was fitted with Sperry-Curtiss automatic stabilising gear for control—thus "George" the automatic pilot, considered by many to be only in his 'teens, is here shown to be approaching his forties!

The Imperial Gift of a hundred or so aircraft offered in 1919 to all Dominions was gratefully accepted by Canada. With these aircraft a Canadian Air Force was established to which in 1923 the title of Royal was granted. It was more of a Government flying service at first than a military force, but certainly none the less useful. Duties included forestry patrol, surveying, mapping and co-operation with the world-famous Royal Canadian Mounted Police.

The serialling system had, not inappropriately, its basis in the civil registration system. On 13th April 1920 the High Commissioner for Canada signed the International Air Convention under which the initial registrations G-CAAA to G-CZZZ were allotted for civil aircraft in Canada. The Air Board of Canada, at that time controlling all Canadian aviation, reserved G-CYAA to G-CYZZ for the Department's own aircraft. Imperial Gift Avro 504K H9622 started this series as G-CYAA, but the Ministry of National Defence, in taking over the R.C.A.F. from the Air Board in 1923, utilised the last two letters only of the civil registration as a military serialling system. The series AA, AB, AC, etc., continued until the late 'twenties when ZZ was reached with a Canadian-built Vickers Vista.

By 1930 a numerical series was in use for all aircraft coming into the Service. Initially it had a range of 1 to 1,000 numbers, broken down in reservations—1–300 training aircraft, 301–400 fighters, 401–600 army co-operation and general purpose, 601–700 transport and communications, 701–800 bombers and 801–1,000 flying-boats. Later the blocking system lapsed and although by 1940 the range had extended beyond 1,000, some machines were still being allotted open numbers in the 1–1,000 range. Two of these deserve mention: 793 was the unfamiliar number of a well-known aircraft, ex-G-AFRG on the British Civil Register and before that K6933 in the R.A.F., the prototype Handley Page Harrow transport; 654 was a Lockheed Hudson (Wks. No. 9595), that logged 2,780 hours up to early 1947, when, instead of being consigned to the scrap-heap, it was sent to the Far North on the most exacting winterisation tests.

When war came in 1939 the strength of the R.C.A.F. was 270 aircraft, of which the only operational machines were nineteen Hurricanes, ten Battles, and eight Stranraers. The remainder were either obsolete or training and communications aircraft.

As a result of the war the numerical range soared, with allocations that reached 16,000 by 1945. Of the numbers taken up, the majority was by Canadian-built training aircraft, Tiger Moths, Harvards, Ansons, Cranes and Cornells. It was a simple series, blocks of numbers allotted in the main consecutively as batches of aircraft were

(Continued overleaf)

**The R.F.C. and R.N.A.S. were intregrated to form the Royal Air Force on 1st April, 1918.*

Commonwealth Serials

(*Continued from previous page*)

ordered. However, in the Dominion, throughout the war, there were almost as many aircraft with R.A.F. numbers as with R.C.A.F. numbers.

Large orders for aircraft were placed by the U.K. Government. To take but one example, the order for Hampdens entailed shipping four pattern aircraft (L4208–4211) from Britain to the Canadian industries concerned. In turn, 160 Hampdens were built between 1939–41, marked complete with their R.A.F. serials (P5298–5346, P5386–5400, P5421–5436, AJ988–999, AN100–167) in Canada. At the same time Hurricanes, and later Mosquitos and Lancasters streamed from Canadian factories to the R.A.F. in the U.K.

A constant flow of American-built aircraft for the R.A.F. passed through Canada on delivery to the U.K. Often batches would be diverted for Canadian use; for example, over a hundred Hudson IIIAs numbered in the R.A.F's BW and FH ranges were retained in Canada.

In the Empire Air Training Scheme Canada took the major share. Orders for training aircraft were placed in Canada both by the R.A.F. and the R.C.A.F. for use in the Dominion. Hundreds of aircraft in the U.K. withdrawn from operational use were shipped to Canada as advanced trainers. Those bought by Canada were renumbered in the R.C.A.F. range, but the majority, provided under Britain's contribution to the training scheme, retained their R.A.F. numbers.

R.C.A.F. squadrons played a magnificent part in the various theatres of the war. In the main they served in R.A.F. Commands; e.g. in Bomber Command No. 6 Group was exclusively R.C.A.F. Their aircraft were provisioned under R.A.F. arrangements and original serial numbers were retained. This paragraph, brief because this particular aspect of serialling is straightforward, may not appear to do justice to that great Force the R.C.A.F. Overseas. It can, however, be qualified by this significant fact: that with the collapse of Germany and Japan in 1945, Canada emerged from the war as the fourth world air power.

Canada built a total of 225 Lysanders for the R.C.A.F. The first and fourth production aircraft (416 and 419) are here shown in service.

A number of Canadian-built Mosquitos and Lancasters and ex-Lease/Lend Dakotas used by the R.C.A.F. in post-war years retained their original R.A.F. serials. Some of these aircraft may still be seen flying on missions to, or through, Britain.

Canada has maintained a strong Air Force since the war and now provides a complete Air Division for the Forces of the North Atlantic Treaty Organisation. The serial range has expanded, with each different aircraft type having separate ranges of numbers. To give but representative examples, the 17,000 range went to Vampires purchased shortly after the war; 18,100 to the Avro CF-100; 19,100—Sabre; 21,000—Lockheed T-33. At the same time lower numbers have been re-allotted, Beechcraft Expeditors procured post-war being numbered as low as 1,400, some taking up numbers previously allotted to Oxfords in 1939.

Since the Siskin IIIA, J7759 in the R.A.F. was re-numbered 10 in the R.C.A.F., twenty-five years ago, hundreds of ex-R.A.F. machines have been taken into the R.C.A.F. range. Now the reverse has taken place. Under the Mutual Defence Aid Pact, some 370 Canadian-built Sabres have been provided for the R.A.F. Many, originally allotted Canadian serials in the 19,100-up range, were placed in the R.A.F's XB and XD series. Others have gone to Greece and Turkey. Perhaps significant of the future was the participation of two R.C.A.F. Canadian-built Avro CF-100s in the 1955 S.B.A.C. Display at Farnborough (Nos. 18321 and 18322).

The Royal Canadian Navy has developed an Air Arm since the war. Initially its equipment came from the Royal Navy and original serial numbers were retained, but with the addition of a heading—ROYAL CANADIAN NAVY. By the allotment of 180 Avengers from the U.S.A. under Mutual Security Aid and orders placed at home for the Grumman S2F-1, a numbering system has been introduced.

Many new aircraft are currently coming "on the books". Canada, the only N.A.T.O. Power without military conscription, indeed without the need for it, is an inspiration to confidence in Commonwealth and Western Defence.

700 Bolingbrokes were built in Canada by Fairchild Aircraft, Ltd. No. 9056 illustrated is a Mk. IV of the 9001-9165 allocation.

P.74 PROGRESS

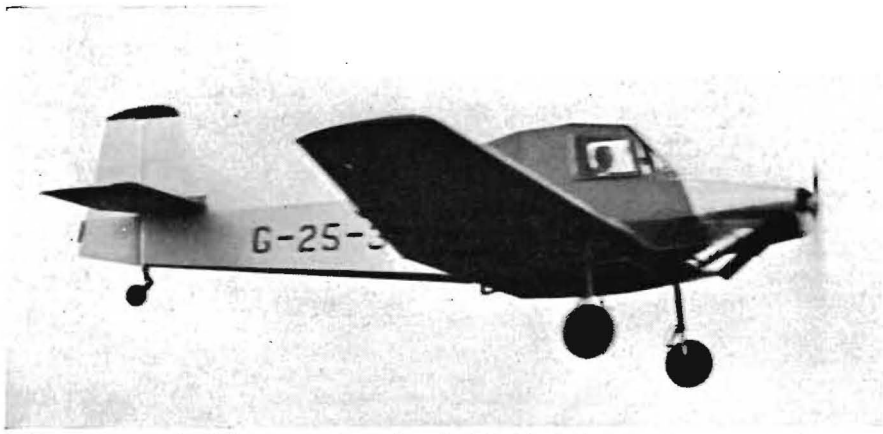
FURTHER details have been released of the Hunting Percival P.74 research helicopter, the first to employ true jet propulsion to drive its rotors. Construction is well advanced, and the makers hope that it will fly during 1956.

There are other gas-turbine powered helicopters flying today but the rotors are either coupled to the engine by shaft drive or driven by compressed air drawn from the engine. The P.74 is powered by two Napier Oryx 750-h.p. engines, the output of which is conveyed to the rotor tips through ducts.

Design work on a ten-passenger development of the P.74, the P.105, has already started. It is expected to fly in 1958, by which time much experience will have been obtained with the P.74.

THE Liverpool Aero Club, a section of the Merseyside and North Wales Flying Club, would be glad to hear from *Air Pictorial* readers in the Liverpool area interested in aircraft recognition, solid scale modelling and having other aviation interests and who would like to consider joining the Club. I will be glad to supply details.—**Michael G. Hope, Hon. Secretary, 3 Renwick Road, Walton Vale, Liverpool 9.**

A recent production Gloster Javelin F(AW) Mk. I is portrayed against a fine panoramic cloudscape.



First photograph of the Auster Agricola, which has been designed for aerial fertilising. Engine is a 240-h.p. Continental.

Did You Know . . . ?

Spot Aviation News from all over the World

UNITED KINGDOM. De Havillands have in the project stage an enlarged version of the Comet with four podded Conway turbojets. The machine will be a non-stop North Atlantic aircraft and is being considered by B.O.A.C.

● The Bristol Orpheus turbojet has been specified for a N.A.T.O. trainer, designs for which are being considered. The Orpheus is expected eventually to be in the 6,000-lb. thrust class.

● The production version of the English Electric P.1 is stated to have two Rolls-Royce Avons in place of the Sapphires originally fitted. It is also reported that a single large engine might be installed, plus a rocket motor.

● Considerable interest is being shown in the Vickers 900 Vanguard in the U.S.A. and Canada. Vickers are offering modifications to the design to meet American requirements, as they did with the Viscount.

● The Blackburn and General Aircraft Beverley may eventually be re-engined for improved performance. Fuel will be kerosene. Two most likely power plant contenders for the conversion are the Eland and the Proteus.

● Vickers are now building one and two off Viscounts—such as those for Hughes Tool Company, United States Steel and Standard Oil—on a new assembly line at Weybridge. The two V.I.P. transport Viscounts for the Indian Air Force are nearing completion there.

U.S.A. Some confusion exists in the design of the Douglas DC-8 and the Boeing Intercontinental. Douglas have three different fuselage shapes and are now said to be considering the use of six instead of four engines to meet the great weight of the aircraft, which is likely to be in the region of 350,000 lb.

● The General Electric J-79 turbojet, rival to the Pratt and Whitney J-75, has now passed its 150-hour type test.

● A large order for the turbojet-powered Northrop Snark missile is likely shortly, and wing fuel tanks have now been added to the type.

● A private-venture jet trainer, the model 73, has been produced by Beech. It is a development of the model 45 Mentor, which it closely resembles. Seating on the model 73 is in tandem under a large clear-view canopy. The single Continental J-69-T-9 turbojet is fed by bulged root intakes.

● Compared with the prototype F9F-9, the new Grumman F11F-1 Tiger has a longer nose, modified fin shape, revised lateral intakes, and a clear-view canopy without rear reinforcement.

● Commercial version of the Pratt and Whitney J-75 engine is the JT4A-3, which it is estimated will deliver between 17,000 and 18,000 lb. thrust.

● Score-card for American jet orders at the time of going to press is 102 DC-8s and 72 Boeing Transcontinentals and Intercontinentals. The list is made up as follows: *Douglas*: P.A.A. 25, United Airlines 30, National 6, K.L.M. 8, Eastern 18, Jap. Air Lines 4, S.A.S. 7, Panagra 4, Panair do Brazil 4*; *Boeing*: P.A.A. 20, American Airlines 30, Braniff 5, Continental 4, Air France 10, SABENA 3. (½These are from the P.A.A. order for 25.)

● The experimental short take-off and landing aircraft, M-232. is being completed by Fairchild at Hagerstown. Two Lycoming GO-580 engines are fitted driving large diameter propellers.

● Output of the Lockheed C-130 Hercules is to be raised to six per month.

● The Boeing Intercontinental will have a span of 141 ft. 6 in., length 145 ft., and height 38 ft. 11 in. All-up weight is at present specified as 295,000 lb., of which no less than 137,800 lb. will be fuel! Payload is given as 38,280 lb., cruising speed will be 547 m.p.h. in still air. Unfortunately, these figures cannot be taken as final, as some of the recent Boeing weight and performance statements differ markedly from those issued by purchasing airlines.

● All-up weight of the Electra has gone up from 98,500 lb. on the original project, model 310, to 110,000 on the current design, model 188. Length is now 104 ft. 2 in. and span 99 ft.

FRANCE. An additional order for Aquilon Interceptors (Venoms) has been placed with SNCASE.

● Two types of air-to-air missile are being developed and produced in France: the Matra R.051 and the SFECMAS 5103.

● Morane Saulnier are considering building a prototype of an eight-passenger jet transport powered by two Turboméca Gabizos, and based on the firm's experience with the four-seater MS-760 Paris.

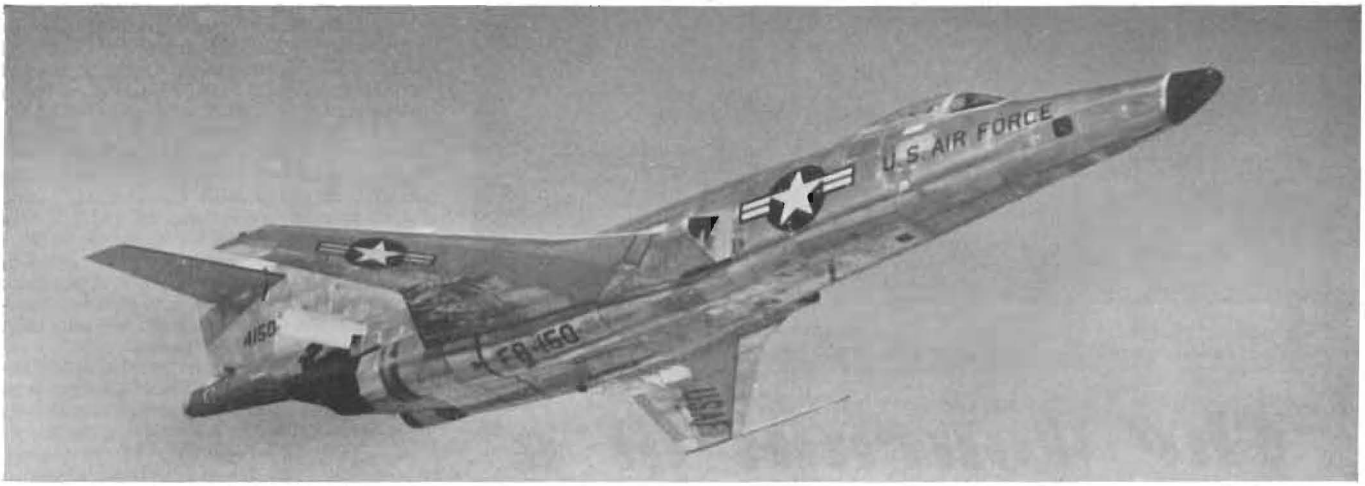
● Air France, in addition to purchasing twelve Caravelles, has taken an option on twelve more.

● The prototype Nord 1226, with a 170-h.p. SNECMA Regnier 4LO2 motor, flew for the first time in December. It is developed from the N-1221.

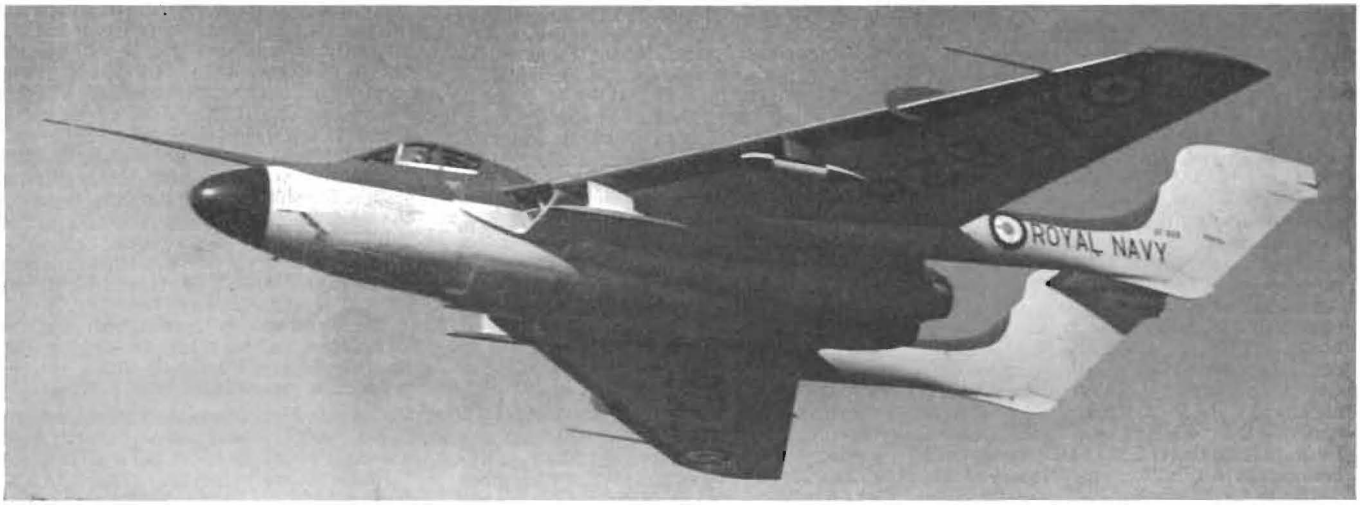
● Prototype of the Boisavia B-260 Anjou is shortly to fly. Data for the machine, which is a five-seater, is as follows: span 41 ft. 5 in. (42 ft. 3 in. over tip-tanks), length 23 ft. 3 in., empty weight 2,000 lb., all-up weight 4,120 lb., range 780 miles (1,240 miles with tip-tanks). Boisavia are also developing a seven-seater Anjou with 220-h.p. Potez 4D.31 in place of the 170-h.p. SNECMA engines on the five-seater.

* *These are from the P.A.A. order for 25.*

The Bell XV-3 convertiplane has made many flights with the twin rotors in the upright position but has yet to convert them for forward flight.

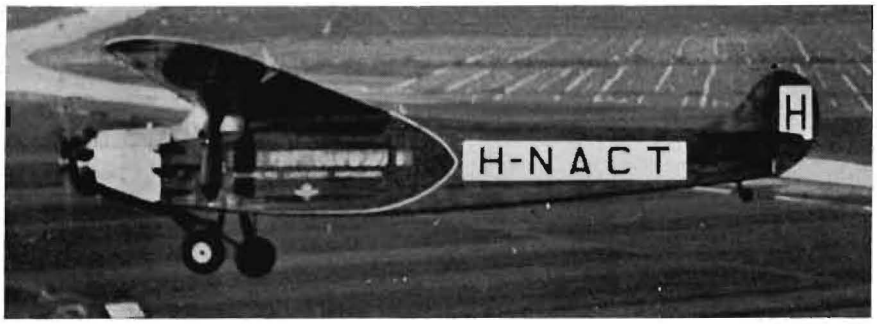


Now in series production for the photo-recce squadrons of the U.S.A.F. is the McDonnell RF-101A, powered by two afterburning 14,250-lb. s.t. P. & W. J57-P-3 turbojets. McDonnell claim that with the RF-101A aerial photography at supersonic speeds is now possible. The RF-101 has an all-flying tailplane and, except for the longer squared-off nose, is similar to the long-range escort fighter F-101A and the F-101B long-range interceptor fighter.



Still unnamed, the de Havilland D.H.110 has been accepted by the Royal Navy as a two-seat, all-weather strike fighter for carrier operations. This view shows the temporary nose probe, as well as the new one-piece dive brake under the fuselage, in line with the wing root. The leading-edge devices are carriers for stores.

Below: Latest variant of the standard piston-engine basic trainer North American T-28 is the T-28C for the U.S. Navy. The cockpit canopy differs from the earlier U.S. Navy T-28B and the U.S.A.F. T-28A, and the T-28C has a revised rear (ventral) fuselage outline to incorporate a deck-landing hook.



The veteran Fokker F.VIIa arrives over Schiphol bearing the registration letters H-NACT. Its previous identities are noted by "Aeroscribe" on this page.

The Journal of a Roving Spotter

AN event which put the clock back thirty years was the landing at Schiphol Airport, Amsterdam, on 30th December of the Fokker F.VIIa H-NACT. This registration identified the Fokker as the first F.VIIa delivered to K.L.M. in 1925, and used by them until 1940; but the aircraft which now bears those letters is not the genuine article.

Believed to be the last surviving F.VIIa, the aircraft which arrived at Schiphol has been purchased by K.L.M. and is to be presented to the Netherlands National Aeronautical Museum which it is planned to establish at Schiphol eventually. It was built in 1928 and was delivered to a Swiss company, Balair, with the registration CH-159, in company with two other F.VIIa's registered CH-157 and 158.

A year later, CH-159 went to Det Danske Luftfart Selskab (D.L.S.) in Denmark and became OY-DED "Aalborg". It served this airline until the outbreak of war, which it survived in a shed at Amager. In 1946, re-registered SE-ASE, it was flying again with Skaaneflyg at Malmo, Sweden, on pleasure trips and was later used on a newspaper delivery service by Captain Küncke.

By this time a veteran, the F.VIIa next reappeared at Schiphol in 1948, flown in on a pleasure trip by eight gliding enthusiasts. They sold it to Det Danske Luftfart Service, who used it, as OY-ASE, for joy-riding and charter flying until it was re-acquired by K.L.M. and Fokker.

So a historic aeroplane has come to its final resting place—and none could be more fitting than Schiphol, where it was built twenty-eight years ago. I wish the history of some historic British aeroplanes was as happy.

* * *

The serial number XK889, carried by the Hunting Percival P.74 helicopter now rapidly nearing completion at Luton (see page 48 for more news of the P.74), is the latest I have seen. This is interesting, for the contract for the P.74 must have been placed at least two years ago, and the serial number usually reflects to some degree the date of contract rather than the date of appearance. However, the first Comet C. Mk. 2 for the R.A.F., as I noted last month, is XK669, and this allocation could not possibly have been made more than a year ago.

Another aeroplane bearing the Percival name made its appearance in December—the Edgar Percival P.9 G-AOFU (silhouette appears on page 54). This interesting aeroplane designed for agricultural duties in New Zealand and Australia, made its first flight at Stapleford Tawney (Abridge, Essex), on 21st December.

Edgar Percival, now director of Edgar Percival Aircraft Ltd. and designer of the P.9, was also founder of the company which is now developing the P.74, but he sold out his interest to the Hunting Group before the war, and is only now staging a comeback in the British aviation field.

Another new aeroplane competing strongly for the agricultural market in New Zealand and elsewhere is the Auster B.8 Agricola, of which the prototype has been registered G-ANYG (see page 50 for photograph). It flew, however, on 8th December as G-25-3, prior to its departure for further trials in New Zealand as ZK-BMI. So far as I am aware, the British registration was never carried.

The Agricola is a notable aeroplane, as the first low-wing Auster design to reach the flight stage. Others had been sketched on paper, the first being the Model L, which was little more than a standard Auster 5 with the wing in the low position.

* * *

I am more than a little intrigued to see that the current register of civil aeroplanes in New Zealand includes five ex-R.A.F. Mosquito 6s. They are owned by Aircraft Supplies Ltd., of Palmerston North—a company which deals, I imagine, in second-hand aeroplanes—and are the genuine British-built article, not of Australian origin as one might imagine.

For the record, they are, with original R.A.F. serials in brackets, ZK-BCT (PZ413); ZK-BCU (RF597); ZK-BCW (PZ444); ZK-BCX (RF849) and ZK-BCY (PZ200). And if any reader in New Zealand is thinking of writing to me about these aircraft, perhaps he will also tell me what lies behind the fascinating entry of "Rotating Wing Glider" for ZK-GAO, owned by Mr. R. F. Brett, of Gisborne.

* * *

My note on the Pioneers built at Prestwick to date, published last month, has, it appears, proved of interest to readers, so it may be useful to bring them up to date. In addition to those I listed, XK368 and XK369 flew in November, and an additional civil example, G-AOGF, has now been registered.

G-ANRG, the demonstrator which appeared at the S.B.A.C. display in 1954, was damaged at Rangoon, Burma, in the course of a Far East demonstration and sales tour in the autumn of 1955. It was returned to Prestwick in crates and, I believe, has not flown since. The tour was continued by G-AODZ after its appearance at the 1955 S.B.A.C. show, and was concluded at the end of the year; it is now back in Scotland.

Of the R.A.F. aircraft operated in Malaya by No. 267 Squadron, XG562 came to grief some little while back, but was successfully repaired on the site and is flying again.

* * *

The designation of civil aircraft in this country at the present time shows as much disregard for consistency as does the military system of which I wrote at length last month. Taking our three most prominent civil constructors at present, de Havilland use the simplest system. Each type bears a distinct design number (e.g. D.H.104 Dove, D.H.106 Comet, D.H.114 Heron), and variants take mark or series numbers from 1 onwards (e.g. Doves 1–6, Comets 1–4, Herons 1–2).

Bristol use a generally similar system, again with type numbers which do not change for variations of the same type, but the mark or series number is less consistent. While Type 171 Sycamores appear as Mks. 1–4, the Type 170 has been produced as the Mks. 1 and 2, 10, 11 and 12, 21 and 22, and 31 and 32.

The Britannia is even more complex, with series numbers commencing at 100. Existing Britannia variants, with a note on production and orders, are as follows:

Series 100. First production batch; Proteus 705, short fuselage and "short-range" wing Prototypes G-ALBO and G-ALRX (lost). Fifteen in production for B.O.A.C. of which G-ANBA–BD have flown; G-ANBE–BO to fly 1956.

Series 200. Proposed pure freighter, with lengthened fuselage. Prototype registered G-AMYK cancelled before completion.

Series 250. Mixed passenger/freighter; Proteus 755, lengthened fuselage, long-range wing. Prototype G-ANGK planned for construction at Filton, cancelled before completion. Three ordered by M.o.S. for trooping and eleven by Transport Command, in production by Short Bros. and Harland.

Series 300. Second production batch. Proteus 755, long fuselage, "short-range" wing. Prototype G-AMYL cancelled before completion. G-ANCA (M.o.S. contract) nearing completion at Filton; G-ANCB–CH (seven for B.O.A.C.) to be built by Short Bros.

Series 310 (Previously 300 LR). As 300 with long-range wing. All production by Bristol at Filton. Prototype G-AOFA to fly 1956; orders from B.O.A.C. (11), EL AL (3) and C.P.A. (3).

Vickers' designating system, to come to the third example, is yet more complex and altogether less satisfactory. The "type" number here is in fact a drawing number reference; consequently, a modification to a standard type may easily lead to a new drawing reference number and therefore a change of "type" number.

The effect of this is easy to see on the Viscount, where each customer receives aircraft of differing "type" number, but a further confusion is that some drawing references to Viscount variants are intended to cover basic members of the Viscount family (e.g. 700, 800, 806, 810, 840). There is no easy way to distinguish these from "customer" designations.

* * *

Since I have, in three previous issues (March, August and November 1955) attempted to keep readers fully informed on the subject of Viscount types, I have little alternative but to continue the series. I hope these contemporary notes will help to preserve, ultimately, a detailed history of one of the most important aeroplanes ever built in Britain. The notes are arranged, as before, in type number sequence:

Type 701. Twenty-seventh aircraft registered G-AOFX. Viscount No. 182, to be named "Sir Joseph Banks".

Type 723. Indian Air Force, numbered IU-683.

Type 730. Indian Air Force, V.I.P., numbered IU-684.

Type 732. G-ANRR, RS, RT leased by Hunting Clan to B.O.A.C. for two years for use by Middle East Airlines; RR operating as OD-ACF and RT as OD-ACG. RS intended to be OD-ACH but now operating with B.E.A.C. on lease from B.O.A.C. as G-ANRS "George Bass".

Type 739. First aircraft for Misrair, Egyptian Airlines, SU-AIC, delivered late in 1955.

Type 745. First aircraft of fifty-seven of this type for Capital now delivered. Registrations commence N7405.

Type 747. Both now operating with Butler in Australia. G-ANXV re-registered VH-BAT, named R.M.A. "Warrel".

Type 749. First for L.A.V. registered YV-C-IMV.

Type 755. G-AOCA-CC sold by Airwork to Cia Cubana de Aviation in Cuba before completion.

Type 802. Further four ordered by B.E.A., bringing total to twenty-six.

Type 803. Four ordered by Air Austria in addition to nine by K.L.M.

Type 806. Fourteen ordered by B.E.A.

Type 807. Three ordered by New Zealand National Airways Corporation.

Type 810D. New basic type. Dart R.Da.7/1 engines. Initial all-up weight 67,500 lb.; structure for ultimate weight of 69,000 lb. Twelve ordered by Continental Air Lines.

Type 840. New basic type. Dart R.Da.8 engines. All-up weight 69,000 lb. Type 810 can be converted to this type if required.

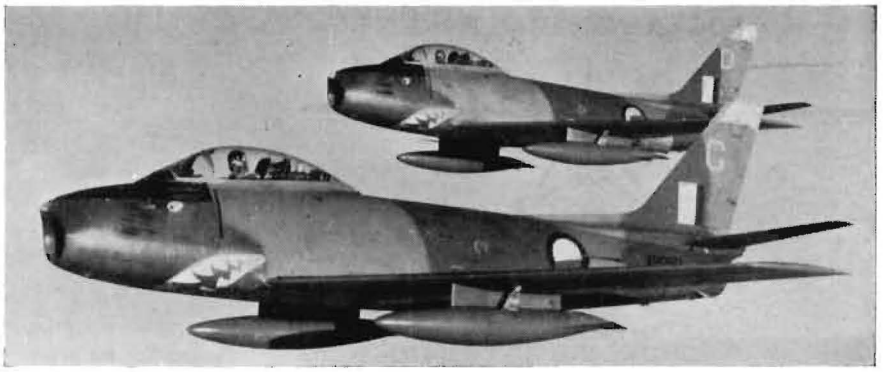
The twenty Vanguards on order for B.E.A. are to be Type 901s.

* * *

Although it is not the job of this column to review books, I feel bound to comment upon the large number of titles now on the market which are aimed directly or indirectly at the "spotter", either confirmed or embryo. I am continually surprised to find that this section of the public provides a sufficiently large market to support so great a variety of books, which currently range in price from 2s. 6d. to 35s.

There can be no doubt, I suppose, that the new edition of *The Aircraft of the World* by Bill Green and Gerald Pollinger (McDonald, 35s.) is the spotter's basic handbook, without which any enthusiast who takes his hobby seriously can hardly afford to be. It illustrates every aeroplane which, so far as the authors have been able to ascertain (and I have detected no omissions), was flying when the book went to press. These are supported by three-view silhouettes of the more important types, and these silhouettes are probably the finest examples of the art to be found in print anywhere.

Less important types are illustrated with a photograph alone, and the only criticism which could possibly be levelled at this book is that the dividing line between "major and minor" types is a trifle arbitrary and not related to numbers flying or any other positive criterion.



These two Sabres of No. 112 Squadron, based with the 2nd T.A.F. in Germany, display the shark's-tooth squadron marking which they are now permitted to use in place of a more conventional fuselage marking.

This same criticism is true, to a degree, of the newest edition of the *Observer's Book of Aircraft* by the same two authors (Frederick Warne, 5s.). This is excellent value, however, and covers 204 modern aeroplane types with silhouettes of all the latest and photographs only of the older ones.

The spotter who wishes to expend less on his handbook can be more selective by choosing the appropriate title from John Taylor's ABC series (Ian Allen, 2s. 6d. each). New editions are, I hear, in active preparation for the coming spotting season.

Each title in this series covers a carefully-defined group of aeroplanes; it is possible, for instance, for the British resident to cover in two volumes every type of aeroplane, military and civil, he is likely to see over this country, with the exception of a few rare visitors. Division between major and minor treatment is on the basis of quantity in service.

Other titles cover American and Canadian military aircraft, Continental (i.e. European and Russian) military aircraft and helicopters. Each is excellent value, although the standard of silhouettes varies a little.

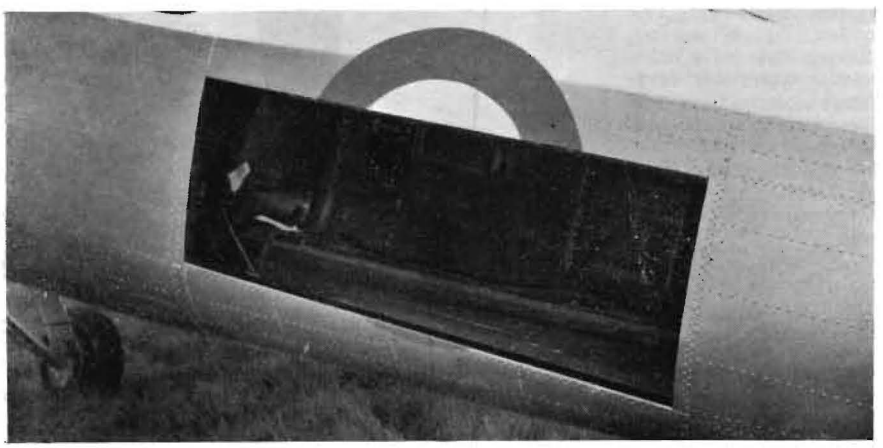
Another good "buy" for a single coin is *Know Your Airliners*, which has just been published for Shell-Mex and B.P. Ltd. by Perry Colour Books Ltd. The text again comes from the pen of John Taylor, who here provides concise information on twenty-eight of the world's most important airliners, including such modern types as the Comet 4, Britannia 300, Caravelle, Friendship and Herald. Each is illustrated by a three-view silhouette and a reproduction in full colour, of a Roy Cross painting of the type in appropriate air-line markings.

I regret having to end on a less happy note by referring to a new publication from Edward O. Beck Ltd. Costing 3s. 6d., this little booklet, entitled *Aircraft of the U.S.A.F. and U.S.N.* is translated from the original Dutch edition by A. P. and P. A. de Jong. Although the cover bears the imprint "Aircraft Recognition No. 1", the book contains no silhouettes, only photographs and descriptive text.

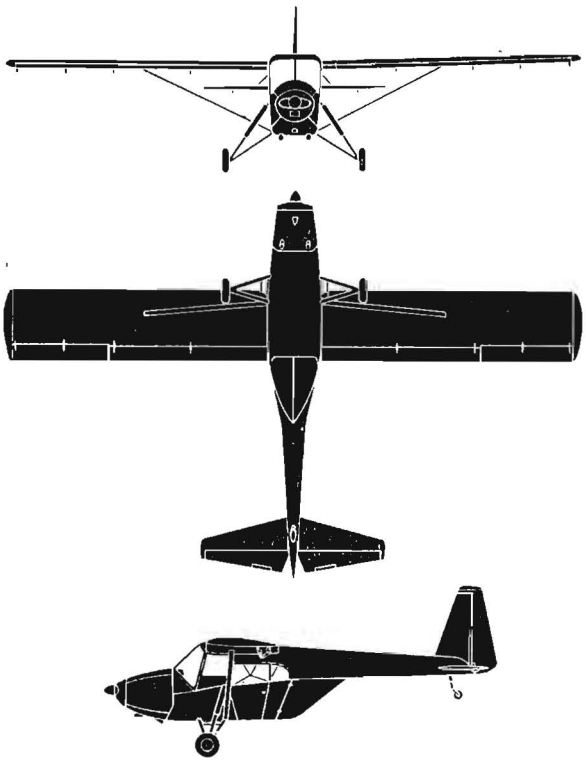
There is no consistency of layout, with illustrations of various sizes (some printed on their side), and as the original edition went to press in Holland in January 1954, the book is inevitably out of date. I can see it filling no need whatever in this country.

"Aeroscribe", January 1956

A close-up of the Pioneer XK367 showing the stretcher-loading hatch. This is one of two Pioneers equipped in this way for ambulance duties.



EDGAR PERCIVAL P.9



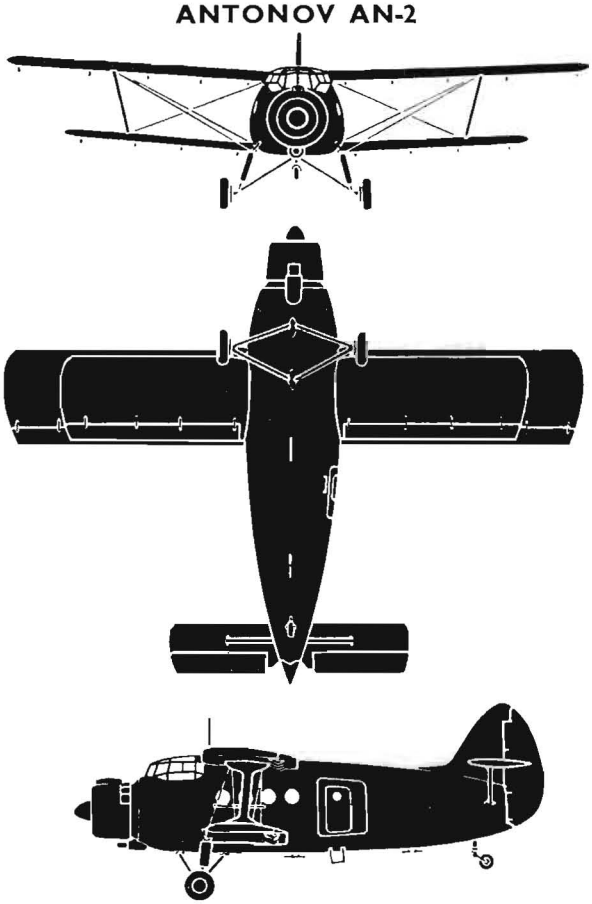
("*Flight*" photograph)

Famous for his pre-war designs such as the Gull series, Mr. Edgar Percival has more recently done an extensive survey of the New Zealand top-dressing market and his latest machine is particularly built for this market, while also being a general-purpose passenger and freight transport. The P.9 first flew from Stapleford Tawney aerodrome on 21st December.

Salient features: A practical design, the P.9 is also easy to recognise. The front fuselage is deep with a typical flat four cowling and intake. The windscreen is large and the side windows are irregular in shape. Aft of the cabin the rear fuselage becomes a boom underneath which are the two clamshell rear loading doors. The boom tapers sharply away to the equi-tapered fin and tailplane which are strut braced. The constant-chord wing has full-span slatted flaps and blunt tips, and is strut-braced to the fuselage. Main undercarriage is supported on single main legs with additional vee bracing to the fuselage. The tailwheel is mounted on a long cantilever leg.

Data: Manufacturer: Edgar Percival Aircraft Ltd., Stapleford Tawney, Essex. Power: one 270-h.p. Lycoming GO-480-B. Accommodation: six seater. Dimensions: span 43 ft. 6 in.; length 30 ft.; height 8 ft. 9 in. Weights: empty 1,850 lb.; all-up 3,415 lb. Performance: maximum speed 138 m.p.h.; cruising 123 m.p.h.; landing speed (light) 37 m.p.h.; rate of climb at sea-level 1,090 ft./min.; endurance $4\frac{3}{4}$ hours.

ANTONOV AN-2



Although a post-war biplane may seem an anachronism in the jet age, there are sound structural features based on deeply-appreciated requirements in the layout of the AN-2, a 1950-vintage utility design by Oleg Konstantinovich Antonov. It is now widely replacing the PO-2 for nearly all light general work.

The designer is well known for his high-performance sailplanes, but he has rarely ventured to produce powered aircraft. The AN-2 is thought to be related to his SKh-1 agricultural aeroplane, but few details of the latter are available. Antonov and three collaborators were awarded a Stalin prize (First Class) in 1952 for work on transport and commercial aviation.

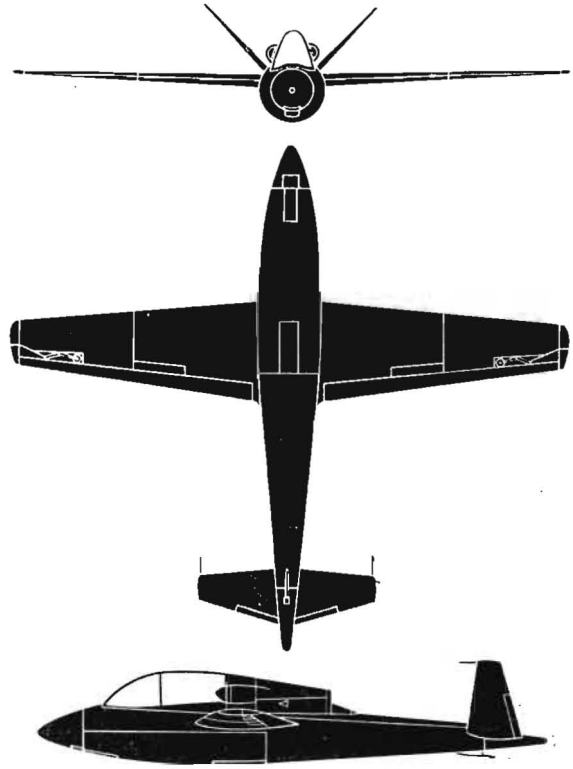
Looking at the AN-2 we see a capacious fuselage supported, not too high off the ground, by a sturdy tail-wheel undercarriage, and supporting in turn sesquiplane wings of large area and generous tail surfaces.

These features make for good performance—such as short landing and take-off runs and steep climbing ability—and ease of loading, at the rough aerodromes from which the AN-2 operates in many parts of the U.S.S.R. The AN-2 also possesses radio aids for night flying.

A float-mounted modification of the AN-2 has recently appeared, and a ski-equipped example formed part of the air support for the 1954 North Polar explorations.

Data: Antonov AN-2. Power: ASh-21 seven-cylinder radial engine. Accommodation: unknown. Dimensions (approx.): span (upper) 46 ft. 8 in.; (lower) 35 ft.; length 37 ft. 2 in. Weights and performance: not available.

SOMERS-KENDALL SK-1

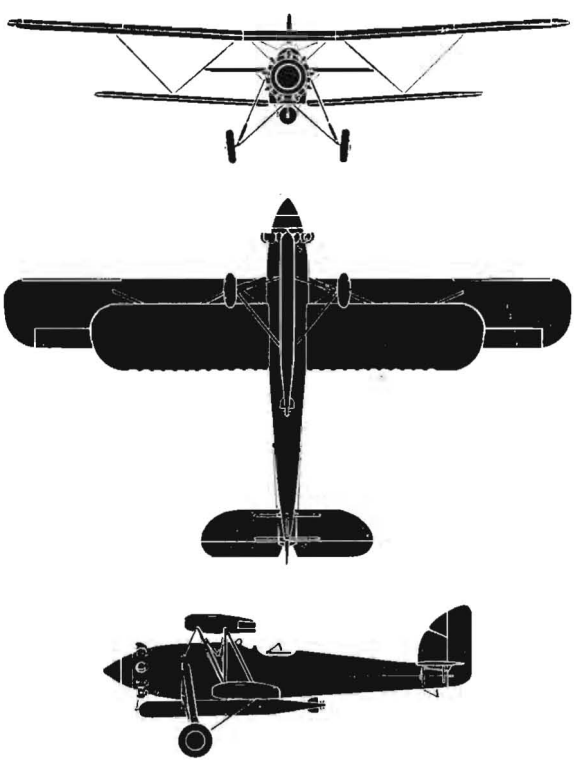


First flown by Mr. Hugh Kendall on 14th October, and registered G-AOBG, the SK-1 is a small two-seat tandem jet racer-trainer produced as a private venture. It is hoped to sell the type at about £10,000 each, and overseas interest as a military trainer has already been evinced. The SK-1 was placed third in the Royal Aero Club competition for racers two years ago.

Salient features: A diminutive mid-wing monoplane, the SK-1 has a dumpy but well streamlined forward fuselage, the rear fuselage tapering sharply away aft. The transparent cockpit cover opens sideways and is faired into the coaming which houses the Palas engine with its elephant-ear intakes and single exhaust pipe. The wings of high aspect-ratio, are equi-tapered and have square tips. The tailplane is of the butterfly type and all-moving. There is a single mainwheel under the fuselage, a backwards retracting nosewheel, and twin outrigger wheels at the wingtips.

Data: Manufacturer: Somers-Kendall Aircraft Ltd. Power: one Blackburn-Turboméca Palas of 350-lb. thrust. Accommodation: two seat. Dimensions: span 22 ft. 9 in.; length 20 ft. 10 in. Weights: empty 810 lb.; all-up 1,500 lb. Performance: maximum speed 332 m.p.h.; cruising 250 m.p.h. at 30,000 ft. Sea-level rate of climb: 1,100 ft./min.

HANDLEY PAGE H.P.34 HARE



First flown in 1928, the Handley Page H.P.34 Hare was a two-seat, day reconnaissance bomber designed to meet the Air Ministry Specification 23/25, calling for high performance both at altitude and sea-level. To provide low-level fighting manoeuvrability, a new radial engine was specified, the exhaust-supercharged Bristol Orion. However, in early trials the supercharger failed to meet the required specification because of the then lack of suitable heat-resistant steels for the turbine blades. Thus the Bristol Jupiter VII with gear-driven blower superseded the Orion. It was planned to fit the later Jupiter X to all four prototypes entered for the 23/25 competition (others being the Hawker Harrier, J8325; Gloster Goring, J8674; and the Westland Witch, J8596), but the Mk. X was delayed in development. For the trials, the Hare and the Harrier were fitted with the Mk. VIII (485 h.p.) while the others had the Jupiter Mk. VI (440 h.p.).

The Hare's designer, G. R. Volkert, revised the day bomber layout to meet Air Ministry Specification 24/25 (see silhouette) for a carrier-based, torpedo-bomber, but this was not proceeded with.

Data: Manufacturer: Handley Page, Ltd., Cricklewood, London, N.W.2. Power plant: one 485-h.p. Bristol Jupiter VIII. Dimensions: span 50 ft.; length 32 ft. 2 in.; height 11 ft. 10 in.; wing area 453.9 sq. ft. Weights: empty 3,050 lb.; disposable load 2,670 lb.; loaded 5,720 lb. (7,021 lb. with Panther). Performance: maximum speed at 5,000 ft. 145 m.p.h.; maximum range 1,000 miles

Cadets of C.C.F./R.A.F. section, Winchester College, trying out the new Slingsby T.42 Eagle at Lasham.

Progress in Glider Training

By DEREK PIGGOTT

AT present there are about twenty Air Training Corps gliding schools and twenty civilian gliding clubs in this country. With the exception of the limited training carried out by the C.C.F./R.A.F. cadets at the larger public and grammar schools, the use of both the Primary type of glider with a frame fuselage and the "Solo" method of instruction have been superseded by the safer and more efficient method of dual flying. Most of this training is done in either Slingsby T.21B Sedbergh or T.31B Cadet Mk. III gliders. Formerly, pupils were taught in the Sedbergh, but were sent solo in a different type of glider with which they were unfamiliar. The introduction of the Cadet Mk. III for A.T.C. training made this unnecessary as it can be flown dual and solo and is a relatively inexpensive machine. However, many gliding clubs are reluctant to use their only two-seater for first solos since, without a subsidy other than a rebate on petrol used for launching, financial considerations control their training policy.

Limited Flights

The main problem of gliding instruction on circuit flights is the very limited time available. A car or winch launch gives a flight of between three and five minutes unless soaring is possible, and, therefore, there is little time to waste if the pupil is to learn anything. It is easier to learn to fly a glider than a light aircraft as there are no engine controls or yawing effects from changes in power. The average pupil with no previous experience takes about thirty to sixty flights of about four minutes each to reach a very safe solo standard, and it is usual to have the pupil doing all the piloting by the sixth flight with little assistance from the instructor even on the take-off and landing.

In the early stages the use of the rudder generally proves most difficult, particularly in the Sedbergh, which has considerable adverse yaw caused by the aileron drag. This complicates the use of the rudder in turns and must increase the time it takes to learn to glide. On more recent types of glider, aileron drag is minimised and the handling is similar to a modern light aircraft.

Planning Required

The gliding instructor must plan the flights carefully in order to make the most of the time in the air. Three or four consecutive launches are needed so that the pupil has a chance to correct his mistakes immediately. The pupil is encouraged to attempt all the flying, including take-off and landing, from the earliest possible moment, since he learns far more by attempting things himself than by watching the instructor. Unlike learning to fly a powered machine, turning is taught as the primary exercise instead of straight flight. Plenty of practice in turning from one direction to another soon makes the pupil's reactions on the controls instinctive, whereas straight flight involves few control movements and is relatively unimportant in glider flying. In this and many other details a special technique for glider instruction has been developed.

The glider pilot has to learn how to deal with a variety of emergencies, since on any flight the launching cable may break or the glider may fly into up or down currents, which may completely upset the routine circuit. Unlike an engine failure, which is a very rare occurrence, such emergencies arise frequently and the instructor must acquaint his pupils with all the possible situations in order to be certain that the correct action will be taken.

Both the Cadet Mk. III and the Sedbergh have proved satisfactory training machines but they both have disadvantages.

The Cadet Mk. III has a high normal rate of descent which limits circuit flights to two or three minutes, with little chance of soaring on a flat site except in good conditions. It is difficult to land it in a predetermined place as it has no air brakes with which to adjust the approach. This is a great disadvantage as time and effort is wasted retrieving the glider after pupil landings. However, the pupils find it easier to fly than the Sedbergh because it has less aileron drag and does not require such a high standard of rudder co-ordination. It is, therefore, easier to fly straight. The Cadet Mk. III is an adequate training machine up to first solo standard, but in British conditions is unsuitable for further training when the pupil is expected to convert on to more advanced types with air brakes.

Docile Machine

The Sedbergh has a good soaring performance but again the handling is not like a modern high-performance glider and the pupil's view is very different from that of any solo glider because of the side-by-side seating. It is a popular machine with the instructors as it is very docile and has a very low landing speed. The use of the spoilers or air brakes can be taught and this enables the pupil's judgment to be developed from the beginning and at the same time reduces the amount of retrieving caused by the glider floating past the landing area into the middle of the field.

The Sedbergh was used for all the dual training and first solos at the civilian gliding club at Lasham in Hampshire. A suitable sack of ballast in the instructor's seat enabled the pupil to fly the same aircraft on which he had been given instruction and, in many cases, long thermal soaring flights were made on early solo flights. This was largely the result of a change of outlook on circuit procedure. The pupil was taught to search for lift and to circle in it without prompting from the instructor. The normal circuit then became the procedure only after an unsuccessful search for thermals instead of general routine. The results of this experiment showed that usually by the time the pupil went solo, he was able to soar if the conditions permitted. After a few solos, pupils flew Prefect and German gliders to gain further experience before finally converting on to the Olympia. The Olympia is much easier to fly than either the Sedbergh or Prefect and German intermediate gliders, and now the logical step of converting direct from the Sedbergh to the Olympia has been adopted. This has increased the amount of soaring carried out at Lasham.

British Military Aircraft Code-Markings

By R. C. STURTIVANT

This final instalment lists the code-letters used by miscellaneous units, including the University Air Squadrons.

FLYING TRAINING COMMAND "F" CODES

19 F.T.S., later R.A.F. College **FAA** (Harvard T.2B), **FAB** (Harvard T.2B), **FAC** (Harvard T.2B), **FAD** (Harvard T.2B), **FAE** (Tiger Moth T.2; Prentice T.1), **FAG** (Anson T.1, T.21; Vampire F.1; Meteor T.7).

20 F.T.S., later 2 F.T.S. **FAI** (Harvard T.2B; Prentice T.1), **FAJ** (Harvard T.2B), **FAK** (Harvard T.2B; Prentice T.1; Tiger Moth T.2); **FAL** (Anson T.1; Prentice T.1; Tiger Moth T.2), **FAM** (Tiger Moth T.2).

21 F.T.S. **FAN** (Harvard T.2B), **FAO** (Harvard T.2B), **FAP** (Harvard T.2B), **FAQ** (not used).

16 S.F.T.S., later 16 F.T.S. **FAS** (Oxford T.2; Anson T.1; Magister T.1), **FAT** (Tiger Moth T.2; Magister T.1), **FAU** (not used), **FAV** (not used), **FAW** (not used), **FAX** (not used), **FAY** (not used).

7 S.F.T.S., later 7 F.T.S. **FBA** (Wellington T.10; Harvard T.2B), **FBB** (Oxford T.2; Wellington T.10; Harvard T.2B), **FBC** (Tiger Moth T.2; Harvard T.2B), **FBD** (Prentice T.1; Harvard T.2B), **FBE** (Prentice T.1; Anson T.1).

S.F.T.S., later 6 F.T.S. **FBG** (Prentice T.1; Harvard T.2B), **FBH** (Prentice T.1; Harvard T.2B), **FBI** (Prentice T.1; Harvard T.2B; Tiger Moth T.2; Balliol T.2), **FBJ** (Harvard T.2B; Magister T.1; Anson T.1; Prentice T.1), **FBK** (Harvard T.2B), **FBL** (not used), **FBM** (not used), **FBN** (not used).

3 S.F.T.S., later 3 F.T.S. **FBP** (Prentice T.1; Harvard T.2B; Tiger Moth T.2), **FBQ** (Tiger Moth T.2; Anson T.1; Magister T.1), **FBR** (Harvard T.2B; Prentice T.1), **FBS** (Harvard T.2B), **FBT** (Harvard T.2B), **FBU** (Harvard T.2B), **FBV** (Tiger Moth T.2), **FBW** (not used), **FBX** (not used), **FBY** (Tiger Moth T.2).

17 S.F.T.S., later 17 F.T.S., later 1 F.T.S. **FCA** (Oxford T.2; Harvard T.2B), **FCB** (Oxford T.2B; Harvard T.2B), **FCC** (Oxford T.2B; Harvard T.2B; Magister T.1), **FCD** (Harvard T.2B), **FCE** (Harvard T.2B; Tiger Moth T.2), **FCF** (Spitfire 5B, 16; Harvard T.2B), **FCG** (Spitfire 16; Prentice T.1).

22 S.F.T.S., later 22 F.T.S. **FCI** (Harvard T.2B), **FCJ** (Harvard T.2B; Anson T.1), **FCK** (Harvard T.2B; Tiger Moth T.2), **FCL** (Tiger Moth T.2B; Prentice T.1), **FCM** (Prentice T.1).

Unknown **FCR** (Spitfire 9).

Empire Flying School **FCT** (Harvard T.2B), **FCU** (Oxford T.2; Master GT.2), **FCV** (Buckmaster T.1; Anson T.12.Srs.1; Magister T.1; Master GT.2; Hotspur T.3), **FCW** (Spitfire 9C; Meteor F.3, F.4), **FCX** (Mosquito T.3; Lancaster B.3, B.1/FE, B.7/FE; Lancastrian C.2), **FCY** (Anson T.1).

21 (P) A.F.U., later 1 (P) R.F.U. **FDA** (Oxford T.2B; Harvard T.2B; Spitfire 16; Meteor T.7), **FDB** (Oxford T.2; Wellington T.10), **FDC** (Tiger Moth T.2; Oxford T.2; Harvard T.2B; Wellington T.10), **FDD** (Oxford T.2; Mosquito T.3; Harvard T.2B), **FDE** (Oxford T.2), **FDF** (Oxford T.2), **FDG** (Anson T.1; Oxford T.2), **FDH** (Wellington T.10).

Central Flying School **FDJ** (Meteor T.7, F.4; Vampire F.3; Oxford T.2; Spitfire 16; Magister T.1), **FDI** (Lancaster B.7/FE; Prentice T.1; Oxford T.2; Anson T.12.Srs.1), **FCK** (Magister T.1; Oxford T.2), **FCL** (Tiger Moth T.2; Oxford T.2; Chipmunk T.10; Auster AOP.5), **FCM** (Harvard T.2B; Auster AOP.5), **FCN** (Harvard T.2B; Oxford T.2), **FCO** (Buckmaster T.1; Anson T.1; Mosquito T.3, FB.6; Harvard T.2B), **FDW** (Spitfire 9C; Harvard T.2B—this code was re-allocated from B.A.S. in May 1947).

8 E.F.T.S. **FDQ** (Tiger Moth T.2), **FDR** (Tiger Moth T.2), **FDS** (Tiger Moth T.2), **FDT** (Magister T.1; Anson T.1).

Beam Approach School **FDU** (Oxford T.2), **FDV** (Oxford T.2), **FDW** (Oxford T.2), **FDX** (not used).

School of Flying Control, later School of Air Traffic Control **FDY** (Hawk Major de Luxe; Anson T.1, T.20, T.21).

1 G.T.S. **FEA** (Master GT.2), **FEB** (Master GT.2), **FEC** (Master GT.2; Anson T.1), **FED** (not used), **FEE** (not used).

3 G.T.S. **FEG** (Master GT.2), **FEH** (Master GT.2), **FEI** (Tiger Moth T.2), **FEJ** (not used), **FEK** (Master GT.2), **FEL** (not used), **FEM** (not used), **FEN** (not used).

21 H.G.C.U. **FEP** (Halifax A.7), **FEQ** (not used), **FER** (not used), **FES** (not used), **FET** (not used).

10 A.G.S. **FFA** (Wellington T.10), **FFB** (not used), **FFC** (not used), **FFD** (Wellington T.10; Horsa 2).

11 A.G.S. **FFE** (not used), **FFF** (Wellington T.10), **FFG** (Master GT.2).

5 A.N.S., later 1 A.N.S. **FFI** (Anson T.1, T.21; Oxford T.2), **FFJ** (Anson T.1, T.21; Wellington T.10), **FFK** (Wellington T.10; Tiger Moth T.2).

7 A.N.S., later 2 A.N.S. **FFM** (Anson T.1; Oxford T.2; Tiger Moth T.2; Wellington T.10), **FFN** (Anson T.1), **FFO** (Wellington T.10), **FFP** (Anson T.20, T.21).

10 A.N.S. **FFR** (not used), **FFS** (Wellington T.10), **FFT** (Anson T.1), **FFU** (not used), **FFV** (Tiger Moth T.2).

Unknown **FFX** (Wellington T.10).

Empire Air Armament School, later R.A.F. Flying College **FGA** (Spitfire 16; Lancaster B.3, B.7/FE; Wellington T.10, GR.13; Valetta C.1, C.2; Hastings C.1; Anson C.19.Srs.2; Martinet TT.1; Lincoln B.2), **FGB** (Wellington T.10, GR.14), **FGC** (Anson T.12.Srs.1, T.1, T.21; Mosquito FB.6; Wellington T.10; Magister T.1; Master T.2; Spitfire 16; Martinet TT.1; Athena T.2; Vampire FB.5; Meteor T.7; Lancaster B.3; Harvard T.2B).

Empire Navigation School, later R.A.F. Flying College **FGE** (Wellington T.10, GR.13), **FGF** (Lancaster B.1/FE; Anson T.1, T.21; Oxford T.2; Spitfire 16; Halifax B.6), **FGG** (Lancaster B.1/FE, B.7/FE; Halifax B.6; Anson T.21; Mosquito B.35; Tiger Moth T.2; Meteor F.3).

Aircraft and Armament Experimental Establishment **FGI** to **FGN** inclusive (not used).

Empire Test Pilots' School **FGP** to **FGR** inclusive (not used).

Airborne Forces Experimental Establishment **FGT** to **FGX** inclusive (not used).

1 E.F.T.S. **FHA** (Tiger Moth T.2), **FHB** (Tiger Moth T.2), **FHC** (not used).

2 E.F.T.S. **FHE** (Tiger Moth T.2), **FHF** (Tiger Moth T.2), **FHG** (Anson T.1).

3 E.F.T.S. **FHI** (Tiger Moth T.2), **FHJ** (Tiger Moth T.2), **FHK** (Tiger Moth T.2).

4 E.F.T.S. **FHM** (Tiger Moth T.2), **FHN** (Tiger Moth T.2), **FHO** (Tiger Moth T.2).

6 E.F.T.S. **FHQ** (Tiger Moth T.2), **FHR** (Tiger Moth T.2), **FHS** (Tiger Moth T.2), **FHT** (not used).

7 E.F.T.S. **FHV** (Tiger Moth T.2), **FHW** (Tiger Moth T.2), **FHX** (Tiger Moth T.2), **FHY** (not used).

11 E.F.T.S. **FIA** (not used), **FIB** (not used), **FIC** (Tiger Moth T.2), **FID** (not used).

15 E.F.T.S. **FIJ** (Tiger Moth T.2), **FIK** (Tiger Moth T.2), **FIL** (not used).

16 E.F.T.S. **FIN** (Tiger Moth T.2), **FIO** (Tiger Moth T.2), **FIP** (Tiger Moth T.2).

18 E.F.T.S. **FIR** (Tiger Moth T.2), **FIS** (Tiger Moth T.2), **FIT** (not used).

21 E.F.T.S. **FIV** (Tiger Moth T.2), **FIW** (Tiger Moth T.2; Auster 5), **FIX** (Tiger Moth T.2).

22 E.F.T.S. **FJA** (Tiger Moth T.2; Auster 5), **FJB** (Tiger Moth T.2; Auster 5), **FJC** (Tiger Moth T.2; Auster 5), **FJD** (Tiger Moth T.2).

24 E.F.T.S. **FJF** (Tiger Moth T.2), **FJG** (Tiger Moth T.2; Magister T.1), **FJH** (not used).

28 E.F.T.S. **FJJ** (Tiger Moth T.2), **FJK** (Tiger Moth T.2), **FJL** (not used).

29 E.F.T.S. **FJN** (Tiger Moth T.2), **FJO** (Tiger Moth T.2), **FJP** (Tiger Moth T.2), **FJQ** (not used).

Central Gunnery School **FJR** (Tiger Moth T.2), **FJS** (Lancaster B.1/FE; Lincoln B.2; Wellington T.3, T.10), **FJT** (Mosquito FB.6; Spitfire LF.16E; Meteor F.3), **FJU** (Martinet TT.1; Tempest TT.5; Proctor C.4; Harvard T.2B; Balliol T.2), **FJV** (Spitfire LF.16E; Meteor F.3, F.4, T.7), **FJW** (Spitfire LF.16E; Vampire FB.5), **FJX** (Master T.2; Harvard T.2B; Meteor F.8).

1511 B.A.T. Flt. **FKA** (unknown).

Unknown **FKB** (Oxford T.2).

1537 B.A.T. Flt. **FKD** (unknown).

1547 B.A.T. Flt. **FKF** (unknown).

Flying Training Command Comm. Flt. **FKN** (Proctor C.3; Oxford C.1; Harvard T.2B; Magister T.1; Anson C.10, C.19.Srs.1).

21 Gp. Comm. Flt. **FKO** (Dominie C.2; Anson C.10, C.19.Srs.1; Proctor C.3, C.4; Oxford C.2; Harvard T.2B).

23 Gp. Comm. Flt. **FKP** (Anson C.19.Srs.2; Proctor C.2; Harvard T.2B).

25 Gp. Comm. Flt. **FKQ** (Tiger Moth T.2; Anson C.10; Magister T.1; Proctor C.3; Anson C.19. Srs.2).

54 Gp. Comm. Flt. **FKR** (Proctor C.3).

Stn. Flt. Cranwell **FKS** (Proctor C.2; Oxford C.2; Tiger Moth T.2).

Cambridge U.A.S. **FLA** (Tiger Moth T.2), **FLV** (Tiger Moth T.2).

Aberdeen U.A.S. **FLB** (Tiger Moth T.2).

Edinburgh U.A.S. **FLC** (Tiger Moth T.2).

Glasgow U.A.S. **FLD** (Tiger Moth T.2).

Belfast U.A.S. **FLE** (Tiger Moth T.2).

St. Andrews U.A.S. **FLF** (Tiger Moth T.2).

Liverpool U.A.S. **FLG** (unknown).

Manchester U.A.S. **FLH** (Tiger Moth T.2).

Leeds U.A.S. **FLI** (Tiger Moth T.2).

Durham U.A.S. **FLJ** (Tiger Moth T.2).

Birmingham U.A.S. **FLK** (Tiger Moth T.2).

Nottingham U.A.S. **FLL** (Tiger Moth T.2).

Bristol U.A.S. **FLM** (Tiger Moth T.2).

Swansea U.A.S. **FLN** (unknown).

London U.A.S. **FLO** (Tiger Moth T.2).

Southampton U.A.S. **FLP** (Tiger Moth T.2; Oxford T.2).

Oxford U.A.S. **FLQ** (Tiger Moth T.2).

Perth U.A.S. **FLR** (unknown).

Wolverhampton U.A.S. **FLS** (Tiger Moth T.2).

Derby U.A.S. **FLT** (unknown).

Yatesbury U.A.S. **PLU** (unknown).

Yatesbury U.A.S. **FLU** (unknown).

201 A.F.S. **FMA** (Wellington T.10; Tiger Moth T.2), **FMB** (Wellington T.10).

202 A.F.S. **FME** (Wellington T.10).

203 A.F.S. **FMI** (Vampire F.1, FB.5), **FMJ** (Meteor F.4), **FMK** (Meteor T.7; Tiger Moth T.2).

204 A.F.S. **FMO** (Mosquito FB.6, T.3; Tiger Moth T.2).

Readers who can fill some of the gaps inevitable in so detailed a history are invited to write direct to *MR. R. C. STURTIVANT, 39 WESTWICK CRESCENT, BEAUCHIEF, SHEFFIELD 8.* A complete list of additions sent in by readers of *AIR PICTORIAL* will be published at the end of this series.

OPPORTUNITY!

Opportunities exist in the Sales Organisation of The General Electric Co. Ltd. for young men 20-22 years of age who are prepared to study for the Ordinary National Certificate in Electrical Engineering.

Applicants should have obtained the G.C.E. at "O" level in at least 3 subjects.

Apply in writing to The Staff Manager, Magnet House, Kingsway, London, W.C.2.

1/72nd Scale Plan of the Fairey Ferret

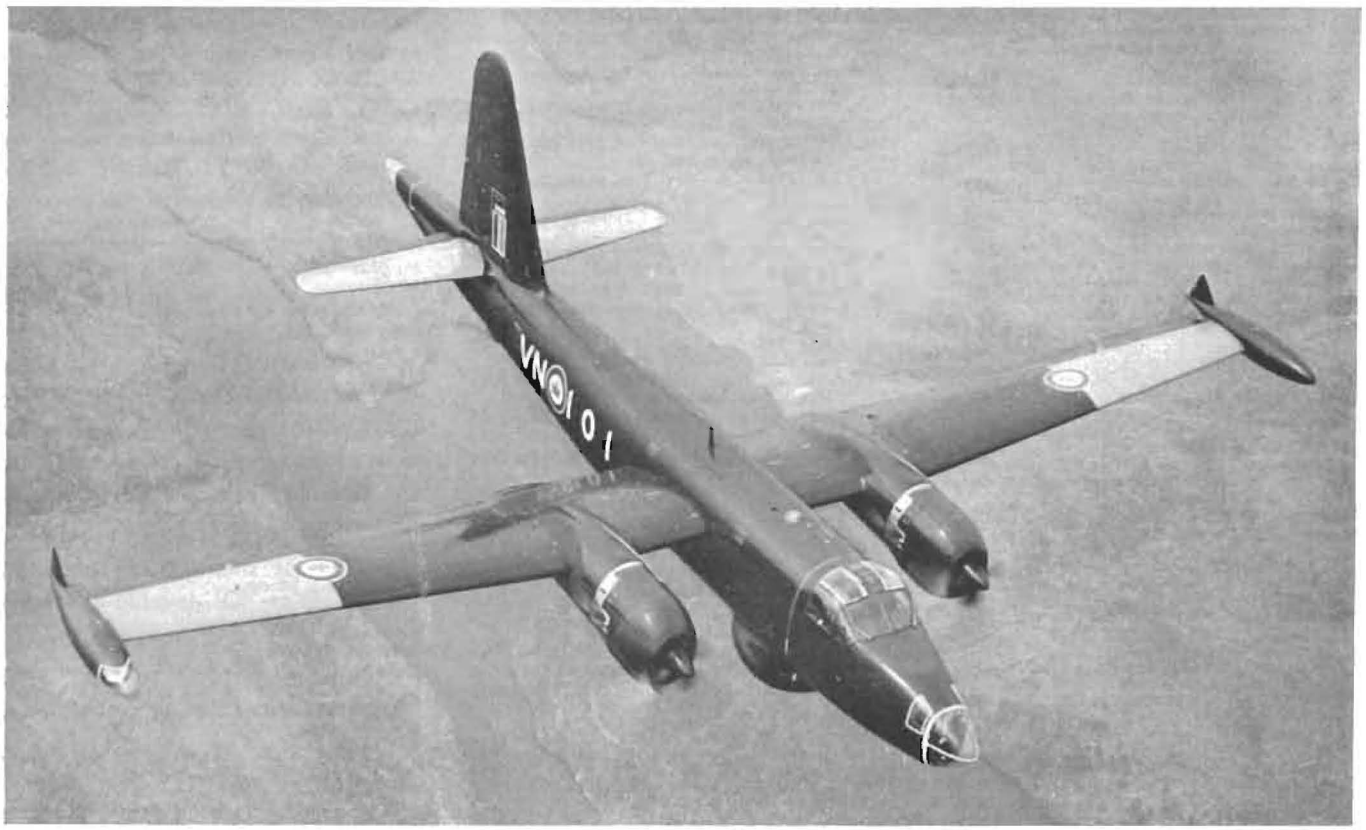
THE Fairey Ferret was designed for Fleet reconnaissance and general-purpose land-based duties. It was the first Fairey aircraft to be built with an all-metal structure covered in fabric.

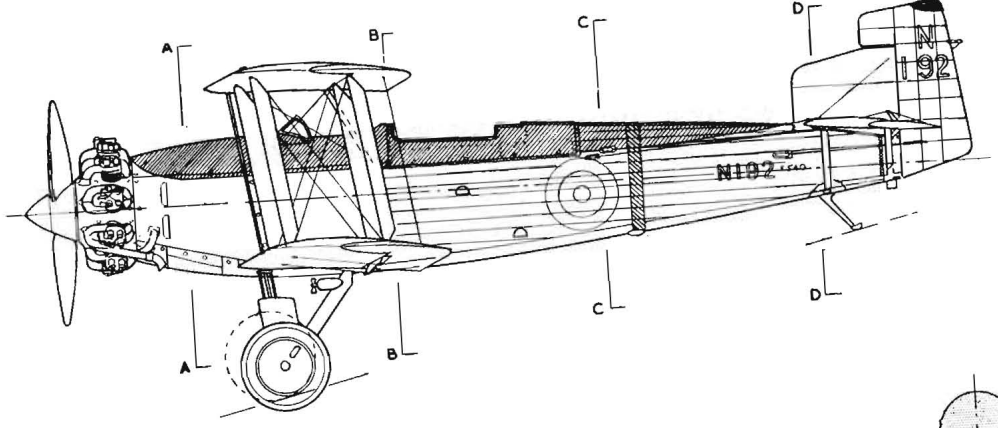
The first Ferret was the Mk. I, serial N190, built in 1925 to Fleet Air Arm Specification 44/22 for a three-seat reconnaissance landplane. It was powered by a 400-h.p. Armstrong-Siddeley Jaguar IV which gave it a top speed of 121 m.p.h. Gross weight was 4,425 lb. and the span was, top wing 39 ft. 7⅜ in., bottom wing 40 ft. 0⅞ in.; length 29 ft. 5¾ in.; height 10 ft. 3¼ in.

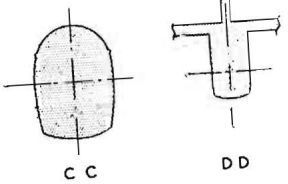
The second machine, the Ferret II (N191), was also designed for reconnaissance and was re-engined with a 425-h.p. Jupiter VI, which increased the maximum speed to 130 m.p h.; the all-up weight went up to 4,585 lb. and the wing span to 40 ft. 7 in. This machine was also flown with an amphibious undercarriage incorporating fixed wheels and floats. It appeared in 1926.

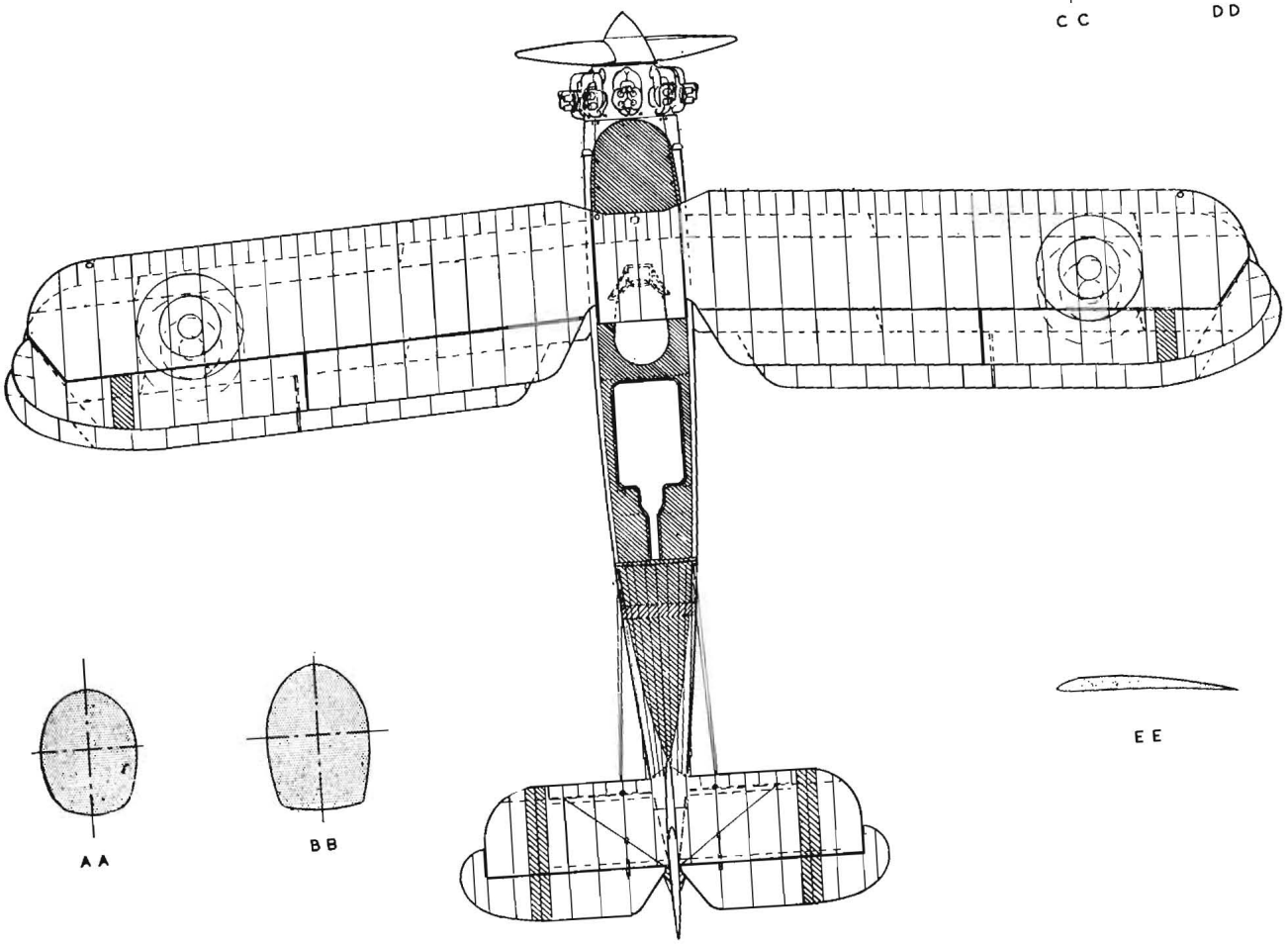
The Ferret III (N192), shown illustrated, flew in 1927. It also had the Jupiter VI and the increased wing span but the cockpit layout was re-arranged as a two-seater for generai-purpose duties. The outline was generally cleaned up and a Fairey high-speed gun-mounting was substituted for the Scarff type. Colour scheme was silver overall, with black on top of fuselage.

Recent visitor to Prestwick was this Lockheed P2V-7 Neptune of the R.C.A.F. in Arctic markings. Wingtips and tailplane are red, and rest of wings and fuselage blue. P2V-7s of the R.C.A.F. are equipped with an M.A.D stinger tail and have under-wing rocket racks.



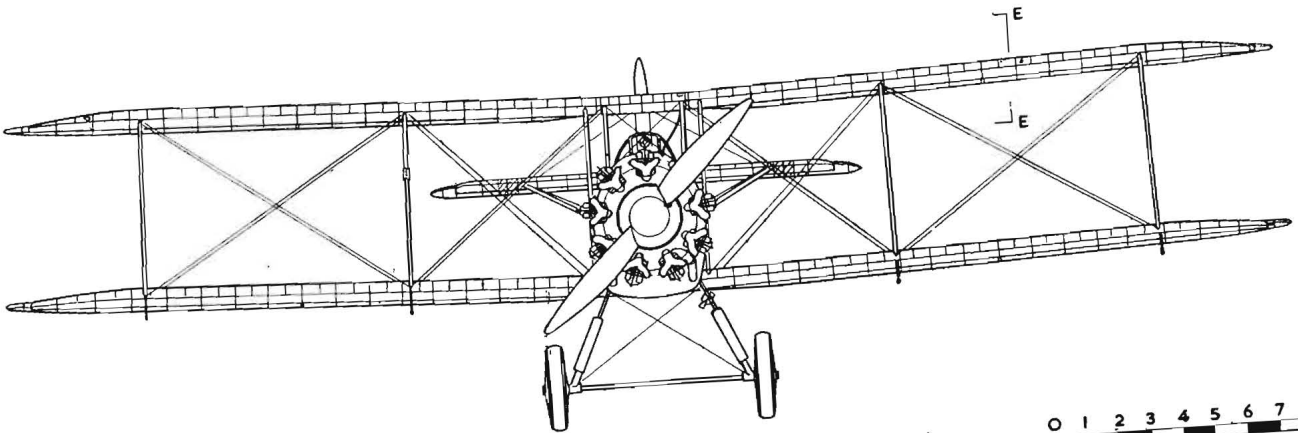

A
B
C
D
N
192
N192
C
D
A
B

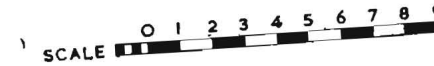

C C
D D



A A
B B

E E


E
E


SCALE
0 1 2 3 4 5 6 7 8

Rule, Britannia

THE Bristol Britannia 100, which is the largest, fastest and almost certainly the most economical turboprop aeroplane in the world, has been given its Certificate of Airworthiness, and B.O.A.C. has received delivery of the first two of the thirty-three Britannias which it has ordered. The total Britannia orders amount to forty-nine aircraft and it is understood that there is shortly to be a further order for Transport Command R.A.F. in addition to the six already announced.

B.O.A.C. intend to introduce the Britannia into their regular services in June. The first route will be London–Johannesburg, which will be flown with only two stops—at Cairo and Nairobi.

Britannia deliveries have been begun within three years and four months of the aircraft's first flight. Since then it has undergone a more intensive programme of testing and development than has ever before been undertaken with any other airliner. This programme includes 20,000 simulated flying hours in the pressure fatigue water tank tests at Farnborough which is equivalent to over six years' airline operations at representative utilisation. Above and beyond that over 2,700 hours flying have been logged by Britannia aircraft since the prototype's first flight and 75,000 miles were flown in a route-proving programme extending over forty-two days.

Those who have heard the Britannia in flight at Farnborough and elsewhere will appreciate the aptness of the name which has been coined to highlight B.O.A.C.'s Britannia advertising programme, "The Whispering Giant". This exceptional silence is fully matched in the interior of the aircraft in flight. Indeed the Britannia seems to many passengers actually quieter than the Comet I and, even abreast of the propellers, conversation is audible in quite low tones. Complete freedom from vibration will of course be an outstanding sales point with the Britannia. Vibration is even more tiring to the long-distance passenger than noise. In the tourist configuration in which there is accommodation for ninety-four passengers, there is no sense of overcrowding.

Personal experience with the Britannia in flight, coupled with its performance and costs in actual operation, confirm early impressions that here is a remarkable aircraft destined for a brilliant future, particularly in the long-range version which will fly the Atlantic non-stop. Much will depend on how quickly the aircraft in its various versions can become available to operators, and it may be assumed that the Bristol Aeroplane Company is fully alive to this vital consideration.

The Miles M.100 Student

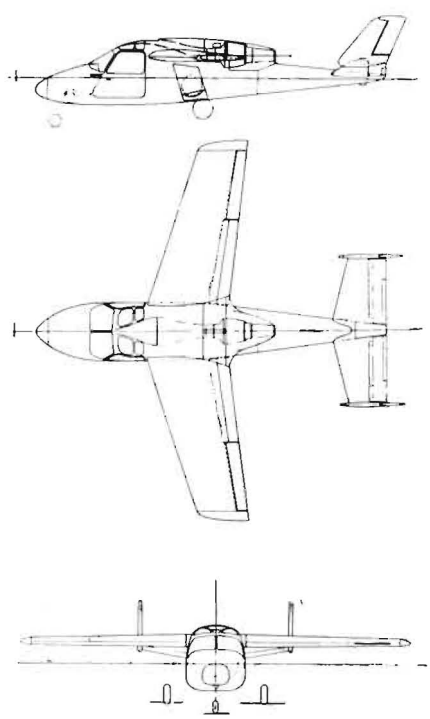
BUILT as a private venture, the Miles M.100 is claimed to be a new approach to economical and efficient training for operational jet aircraft. Designed into it is the possibility of development, for trainers usually have a long service life.

The new trainer will be powered by a Blackburn Turboméca Marboré II, which will give it a top speed of 295 m.p.h. and a cruising speed of 254 m.p.h.

Large car-type doors are fitted giving easy entry and exit to the roomy cockpit. The doors when jettisoned leave an unobstructed emergency exit.

In addition to basic training, the Student can be used for more advanced instruction including gunnery, dive-bombing and rocket-firing training. Other possible versions are a communication aircraft, a ground support aircraft and an A.O.P.

Data: Span 28 ft.; length 27 ft.; height 6 ft. 3 in.; wing area 140 sq. ft.; wing-loading (trainer) 22 lb./sq. ft.; diving speed 460 m.p.h.; take-off weight 3,600 lb.



R.A.F. Adopts New Alphabet

DURING the next three months air crews, air traffic control staffs and other members of the R.A.F. will be busy re-learning the alphabet.

This is the new phonetic alphabet adopted by the International Civil Aviation Organisation and the North Atlantic Organisation. Its main use is in air-to-air and air-to-ground conversations by radio-telephony.

The Royal Air Force with its widespread commitments in N.A.T.O. and world-wide civil aviation facilities has decided to adopt the alphabet, and it will come into use on 1st March. The new alphabet is being adopted by civil airlines; several of them use it now, and its use will become world-wide in the future.

The new alphabet consists of the following words, the old is given in brackets.

A	Alfa (Able)	N	November (Nan)
B	Bravo (Baker)	O	Oscar (Oboe)
C	Charlie (Charlie)	P	Papa (Peter)
D	Delta (Dog)	Q	Quebec (Queen)
E	Echo (Easy)	R	Romeo (Roger)
F	Foxtrot (Fox)	S	Sierra (Sugar)
G	Golf (George)	T	Tango (Tare)
H	Hotel (How)	U	Uniform (Uncle)
I	India (Item)	V	Victor (Victor)
J	Juliet (Jig)	W	Whisky (William)
K	Kilo (King)	X	X-ray (X-ray)
L	Lima (Love)	Y	Yankee (Yoke)
M	Mike (Mike)	Z	Zulu (Zebra)

Comet's World Record

THE Comet III, a development aircraft for the new Comet IV, is due to go into service with the B.O.A.C. early in 1959. On 28th December the Comet III completed the first round-the-world flight by a jet airliner, in the course of which it covered approximately 30,000 miles.

Comet IV will carry sixty first-class passengers with baggage and freight representing a total capacity pay load of 16,720 lb. over stage lengths of 3,000 miles. Alternatively, it will carry a pay load of 19,300 lb. over stage lengths of more than 2,700 miles, taking into account full allowances for head winds, take-off and landing, stand-off over destination, and a diversion of 200 miles. The optimum cruising Mach number is 0.74 which is the rough equivalent to 500 miles an hour, under normal cruising conditions. The maximum take-off weight of the Comet IV would be 152,000 lb.

This represents an aircraft capable of operating all world routes except the non-stop flight across the Atlantic, where the conditions call for an exceptionally large aircraft for non-stop performance. The Comet will be able to accomplish the North Atlantic operation with one stop.

Specimen journey times for the Comet IV will be:

London–Sydney within 30 hours with 4 halts; Honolulu–Vancouver 2,700 miles in 5½ hours eastbound; Honolulu–San Francisco 5 hours; Vancouver–Toronto 4 hours.

R.A.A.F. Appointment

THE Air Ministry announces the appointment of Squadron Leader Reginald Ernest Tickner, a Regular officer, to command No. 605 (County of Warwick) Squadron of the Royal Auxiliary Air Force, at R.A.F. Honiley, near Kenilworth, Warwicks.

PHOTOS BY REQUEST

CONVAIR YB-60

The Consolidated-Vultee YB-60 was built four years ago to meet the same overall specification as the Boeing B-52A Stratofortress. The latter faced a considerable challenge because the Convair YB-60 had the initial advantage of being a direct development of the B-36, a standard production inter-continental heavy bomber. The Fort Worth, Texas, engineers retained as much of the production B-36 as possible so as to permit a rapid tooling change-over to the YB-60 had the design secured the contract. The greater part of the fuselage was retained and built on to the new swept wings and tail assembly. Two YB-60 prototypes were built, the first taking the air on 18th April, 1952. Like the YB-52, the YB-60 mounted eight 8,800-lb. s.t. Pratt & Whitney J57-P-3 turbojets in four twin pods, but being bulkier and heavier than the YB-52, the maximum speed was 30 m.p.h. slower, 620 m.p.h. Loaded weight, 360,000 lb. Service ceiling, over 50,000 ft. Span, 206 ft.; length, 171 ft.

LOUGHEAD MODEL G

Two young brothers, Alan and Malcolm Loughead, designed and built their first successful aeroplane in 1912—the three-seat Model G seaplane with a useful load of 584 lb. This wood and fabric-covered biplane was test-flown by the brothers Loughead at Santa Barbara, California, and three years later was a main attraction at the Panama Pacific International Exposition held at San Francisco in 1915. Hundreds of visitors to the exhibition had their first experience of air travel in the Model G. An unusual feature of the design was the mounting of the ailerons midway between the unequal-span mainplanes. A modern touch was the main, flat-bottom float which served in much the same manner as the current hydroski. All-up weight, 2,200 lb. Maximum speed, 63 m.p.h. at sea-level on 80 h.p. from the Curtiss O liquid-cooled, upright-vee, 8-cylinder motor. Span, (upper) 46 ft., (lower) 36 ft.; length, 30 ft.; height, 10 ft.

VICKERS TYPE 195 VANNOCK II

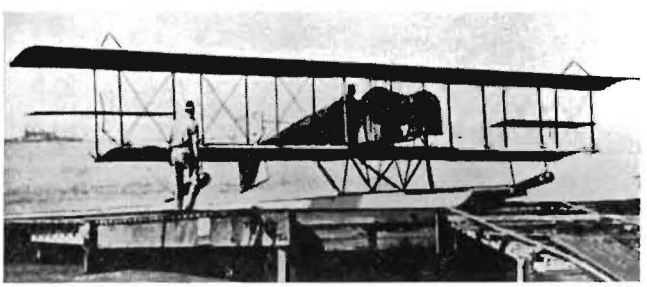
The Vickers Vannock was designed to meet the Air Ministry Specification B.19/27 calling for a long-range night bomber.

Only one prototype Vannock was built, J9131, but it was twice modified and given new type numbers. The Vannock Mk. I, Type 150, was powered by two Rolls-Royce Kestrel inlines, and fitted with single-bay outer wings. The Vannock Mk. II, Type 195, was re-engined with two Bristol Pegasus I.M.3 radials, and had a three-bay wing. The final form reverted to two-bay wings of increased area. This, the Type 255, was also powered by two Pegasus I.M.3s. All-up weight of the four-seat Vannock Mk. II was 16,000 lb. Span, 76 ft. 6 in.; length, 60 ft. 4 in.

FAIREY FANTOME

Often referred to as the world's most beautiful biplane, the Fairey Fantôme (Belgian name: Féroce) was designed, and built, in 1935 by Marcel Lobelle, whose most recent work is the M.L. inflatable-wing A.O.P. The single-seat interceptor Fantôme was a logical development of the Firefly IIM biplane then used by Belgium.

Four Fantôme sets were produced, the first being assembled in England as F-6 and later G-ADIF. While on test at Evere in Belgium the first prototype crashed, killing the pilot, S. H. G. Trower. The photo shows L7045, which was assembled in Belgium and tested at A. & A.E.E., then at Martlesham Heath. No 20-mm. hub cannon was fitted to the 925-h.p. Hispano-Suiza 12 Yrs, the armament being two cowl-mounted and two lower-wing-sited 0.303-in. machine guns. The other two Fantômes were purchased by the Russians and fought in Spain—one was shot down and the other gave good account of itself. Loaded weight, 4,120 lb. Maximum speed, 270 m.p.h. at 13,100 ft. Duration, 2 hours. Span, 34 ft. 6 in.; length, 27 ft. 6 in. (*Photo; Archives G. Raedemaeker, Brussels.*)



VICKERS TYPE 103 VANGUARD

Adoption of the name Vanguard by Vickers Armstrongs for their latest propjet transport recalls the original Type 103 Vanguard of 1922. The 1922 Vanguard was a civil development of the Victoria military troop transport and carried twenty-three passengers.

The prototype, G-EBCP, was handed over to Imperial Airways for evaluation, and it was used on the London-Paris-London day-light round trips. Proving flights were extended through 1927 and 1928. Eventually the Type 103 Vanguard was returned to Vickers, and on 16th May, 1929, G-EBCP crashed into the Thames near Shepperton, Middlesex, killing the Vickers test pilot, Scholefield. The Vanguard had an all-up weight of 17,600 lb., and was powered by two 600-h.p. Rolls-Royce Condors. Span was 88 ft.

British Civil Register News

NEW REGISTRATIONS

G-AOFW Douglas C-54A-DC Skymaster (10351)—Air Charter Ltd. (Previously I-DALV; validation of U.S.A. C. of A. for one month)
G-AOFX Vickers Viscount 701 (182)—B.E.A.
G-AOGF Prestwick Pioneer (118)—Scottish Aviation Ltd.
G-AOGI D.H.82A Tiger Moth (DF186)—W. A. Rollason Ltd.
G-AOGJ D.H.82A Tiger Moth (T7025)—W. A. Rollason Ltd.

RESTORED TO REGISTER

G-AHJI Bristol 170 Mk. 21 (12741)—Air Kruise (Kent) Ltd. (Previously F-DABI)

CANCELLATIONS

(Abbreviations: D—destroyed, SA—sold abroad, BU—broken up)

G-ACYO Miles M2F Hawk Major (121) *(D)*—F. H. Stirling
G-ADPJ B.A.C. Drone (7) *(D)*—A. C. Waterhouse
G-AIVI Vickers Viking 1B (222)—First Air Trading Co. *(SA*—Germany)
G-AIVM Vickers Viking 1B (226)—B.E.A. *(SA*—Germany)
G-AJAT Fairchild 24W-41A Argus (792)—Cartwright Hamilton Aviation Ltd.; *(SA*—Germany)
G-AJBX Vickers Viking 1B (249)—Eagle Aircraft Services *(SA as* D-AFIX)
G-AKNV D.H.89A Rapide (R5922)—Fairey Aviation Co. *(SA*—Belgium)
G-AKOB D.H.89A Rapide (R9564)—Dragon Airways Ltd. *(SA as* VP-KNS)
G-ALEO Percival Proctor 4 (NP288) *(D)*—Wiltshire School of Flying
G-ALTM D.H.104 Dove 2 (04236)—B.O.A.C. (Damaged)
G-AMCM D.H.82A Tiger Moth (DE249) *(D)*—R.A.E. Aero Club Ltd.
G-AMJN D.H.82A Tiger Moth (DE142)—Cartwright Hamilton Aviation Ltd.; *(SA*—Germany)
G-AMLJ Bristol 170 Mk. 31 (13072)—Skyways Limited *(SA*—Lebanon)
G-ANJS Westland S.55 Series 1 (WA18)—South Georgia Co. Ltd. (Lost at sea)
G-ANOJ D.H.82A Tiger Moth (EM814)—W. S. Shackleton Ltd. *(SA*—French Somaliland)
G-ANPR Percival Proctor 3 (HM431)—B. I. Ker *(SA as* VH-BPR)
G-ANPW D.H.82A Tiger Moth (DE603)—Continental Aircraft Services Ltd.; *(SA*—Australia)
G-ANSJ D.H.82A Tiger Moth (T6802)—L. E. Harris *(SA as* ZK-BLV)
G-ANSK D.H.82A Tiger Moth (T7399)—L. E. Harris *(SA as* ZK-BKF)
G-ANSL D.H.82A Tiger Moth (T7738)—L. E. Harris *(SA as* ZK-BLQ)
G-ANYG Auster B/8 Mk. 1 (B101)—Auster Aircraft Ltd. *(SA as* ZK-BMI)
G-ANYY Percival Proctor 4 (NP368) *(BU)*—R. J. Coxon
G-AOEV D.H.82A Tiger Moth (R4833)—W. A. Rollason Ltd. *(SA*—Germany)
G-AOEW D.H.82A Tiger Moth (NM211)—W. A. Rollason Ltd. *(SA as* D-EDOR)
G-AOGI D.H.82A Tiger Moth (DF186)—W. A. Rollason Ltd. *(SA as* OO-SOA)

ALTERATIONS

G-AEFT Aeronca C-3 (A610)—Not known. Temporarily unregistered; (Renewal of validation of U.S.A. C. of A.)
G-AEWL D.H.89A Rapide (6367)—Aviation Supplies Co.
G-AFFJ Piper Cub J-3 (1165)—Not known. Temporarily unregistered; (Renewal of validation of U.S.A. C. of A.)
G-AFNI D.H.94 Moth Minor (94035)—C. H. Croxson & Partner
G-AGON Vickers Viking 1A (4)—Not known. Temporarily unregistered
G-AHCR Taylorcraft Plus D (211)—Airscooters Ltd.
G-AHPR Vickers Viking 1B (164)—Field Aircraft Services
G-AHVR Taylorcraft Plus D (170)—E. F. Allchin
G-AIPH Auster 5 J.4 (2077)—Not known. Temporarily unregistered
G-AIVB Vickers Viking 1B (215)—First Air Trading Co.
G-AJAB Auster J/1N (2235)—Mitchell Aircraft Ltd.
G-AJBP Vickers Viking 1B (242)—First Air Trading Co.
G-AJBU Vickers Viking 1B (246)—Field Aircraft Services
G-AKAT Miles M.14A Hawk Tr. 3 (T9738)—Mitchell Aircraft Ltd.
G-AKAU Miles M.14A Hawk Tr. 3 (R1976)—Mitchell Aircraft Ltd.
G-AKYO D.H.82A Tiger Moth (T7470)—John Neasham Ltd.
G-ALFE Miles M.14A Hawk Tr. 3 (V1086)—J. A. S. Crawford
G-ALYB Auster 5 (RT520)—Humber Ship Management Co.
G-AMFP Auster J/5B Autocar (2933)—Borough of Southend-on-Sea
G-AMGJ Vickers Viking 1B (295)—First Air Trading Co.
G-ANCX D.H.82A Tiger Moth (T7229)—W. A. Webb
G-ANCZ D.H.82A Tiger Moth (W7970)—J. Crewdson & Partner
G-ANKJ D.H.82A Tiger Moth (NL929)—John Neasham Ltd.
G-AMRD D.H.82A Tiger Moth (N6547)—D. E. Bianchi
G-ANSA D.H.82A Tiger Moth (N6944)—Blackpool & Fylde Aero Club
G-ANVK Percival Proctor 4 (NP225)—Continental Aircraft Services
G-AOAP Percival Proctor 4 (NP178)—Continental Aircraft Services
G-AOAR Percival Proctor 4 (NP181)—Continental Aircraft Services
G-AOAS Percival Proctor 4 (NP186)—Continental Aircraft Services
G-AOAT Percival Proctor 4 (RM226)—Continental Aircraft Services
G-AOAU Percival Proctor 4 (NP227)—Continental Aircraft Services
G-AOAV Percival Proctor 4 (RM230)—Continental Aircraft Services
G-AOAW Percival Proctor 4 (NP269)—Continental Aircraft Services
G-AOAX Percival Proctor 4 (NP273)—Continental Aircraft Services
G-AOAY Percival Proctor 4 (NP289)—Continental Aircraft Services
G-AOAZ Percival Proctor 4 (NP326)—Continental Aircraft Services
G-AOBA Percival Proctor 4 (NP327)—Continental Aircraft Services
G-AOBB Percival Proctor 4 (NP342)—Continental Aircraft Services
G-AOBC Percival Proctor 4 (NP363)—Continental Aircraft Services
G-AOBD Percival Proctor 4 (NP385)—Continental Aircraft Services
G-AOBE Percival Proctor 4 (NP403)—Continental Aircraft Services
G-AODI Agusta Bell 47G (042)—Helicopter Services Ltd. (Validation of Italian C. of A. for two months)
G-AODS D.H.82A Tiger Moth (R5041)—Universal Flying Services
G-AODU D.H.82A Tiger Moth (DE975)—Universal Flying Services
G-AOEJ Percival Proctor 3 (HM358)—W. A. Webb
G-AOEM D.H.82A Tiger Moth (T6063)—Not known. Temporarily unregistered

AIRPORT NOTES—INTERESTING VISITORS

Bovingdon

7/12	RF186 C-H	Lancaster MR.3
	XA880	Devon C.1—T.R.E., Defford
	26017 46-18	Italian Air Force Packet—ex-C-119G-15-FA 52-6017
	53-7923 "1"	L-20A—U.S. Army, 32nd A.A. Brigade, Hendon
	51-2602	C-119—782nd T.C. Squadron, Evreux
	42-23934	C-47—7600 Support Squadron, Madrid, Spain
8/12	TG505 B-A	Hastings Met.1—Aldergrove
	26041 46-28	Italian Air Force Packet—ex-C-119G-30-FA 52-6041
	51-2634	C-119—780th T.C. Squadron, Evreux
9/12	45-1067A	VC-47D—1110th A.S. Group, Lowry Air Force Base, U.S.A.
	45-1073	C-47—1603rd Support Squadron, Nouasseur (MATS)
	99844 JM/844	R4D-6—U.S. Navy, Hendon

(Continued on page 64)

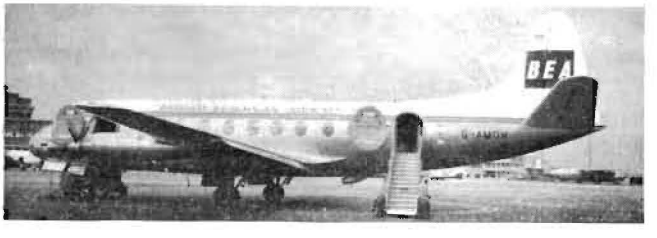
The sole twin-boom Cancargo CBY-3 Loadmaster (N17N) of 1945 now has a new paint finish and markings of Rutas Aereas Nacionales S.A., Venezuela. Since this photograph was taken the Registration N17N has been altered to YV-X-ERC (X=experimental) (*Photo: Harold G. Martin, Miami, Fla.*)

Seen in the United Kingdom recently, a Lockheed P-38L (N65485), orange overall, of World Wide Surveys, Inc. Note camera positions.

Destined for the Argentine air force, T90 is one of a number of ex-B.E.A. Viking 1Bs, originally cocooned at London Airport.

Photographed at Blackbushe recently, an Israeli air force Nord 2501-1S (5761) with radio call sign 4X-FAP, for ferrying purposes.

Two revised colour schemes: *Top:* Viscount 737 CF-GXK at Dorval, the temporary T.C.A. markings now replaced by those of the owners, the Canadian Department of Transport. (*Photo: G. A. Fuller, Montreal.*) *Bottom:* Revised B.E.A. tail markings on Viscount G-AMOH.



Noteworthy S-55s: *Top:* Since June 1955, U.S.-built S-55s have had retrofit additional side windows, and in the case of Sabena, nose lights. (*Photo: P. Bastin, Brussels.*) *Bottom:* French Indo-China WS-55, utilising R.A.F. serial WJ600. (*Photo: JM/SPB.*)

AIR PICTORIAL'S PHOTO-REVIEW

Two modified B-25 Mitchells: *Top:* R.C.A.F. crew trainer with revised nose. *Bottom:* Executive conversion (N122B) with new windows, rear ventral entry and 200 U.S. gallon wing tanks. (*Photo: Levy-Artof, via Esso Air World.*)

Commonwealth Neptunes: *Top:* Seen in Europe recently, the R.C.A.F. P2V-7 King Neptune with under-wing rocket rails. (*Photo: H. G. Martin.*) *Bottom:* A89-311 of No. 11 R.A.A.F. Squadron, Richmond, N.S.W., is a P2V-5 now fitted with the submarine detection tail extension of the P2V-7. (*Photo: B. Blackmore, Campsie, Australia.*)

AIRPORT NOTES (*Continued from page 62*)

11/12	JA5016	Beechcraft B-50 Twin Bonanza—left for Marseille *en route* on delivery flight by Fleetways to Japan
	51-034	SA-16A-GR—66th A.R.S., Manston
12/12	51-6515	L-20A—92nd Fighter Squadron, Manston
	26002 46-5	Italian Air Force Packet—ex-C-119G-10-FA 52-6002
15/12	51-8254	C-119—582nd A.R.S., Molesworth
	42-72760	C-54—7405th Support Squadron, Wiesbaden
16/12	WG554 A-A	Shackleton MR.2—grey/blue
	26025 46-36	Italian Air Force Packet—ex-C-119G-20-FA 52-6025
	331	Bristol 170 Mk. 31—(c/n. 13124); ex-G-AMRO); Royal Iraqi Air Force
	CP37 OT-CBQ	Belgian Air Force Packet—ex-C-119G-35-FA 52-6055
	43-48883	C-47—7th Air Division H.Q., Northolt
18/12	AM107	Dornier wings from No. 71 M.U., Bicester, for use by M.T.C.A. Fire Section; R.A.F. roundels still on wings
		Hampden fuselage section, as yet unidentified, also from No. 71 M.U., Bicester, for same use as Dornier wings. Coastal Command torpedo-bomber with grey upper and white lower surfaces, torpedo switch in cockpit
19/12	26008 46-20	Italian Air Force Packet—ex-C-119G-10-FA 52-6008
20/12	50856 JM/856	R5D-2Z—U.S. Navy, Hendon
	17098 JM/098	R4D-8—U.S. Navy, Hendon
	43-15672	C-47—465th T.C. Squadron, Evreux
22/12	53-7906 "2"	L-20A—U.S. Army, 32nd A.A. Brigade, Hendon
	42-72440	SC-54—67th A.R.S., Prestwick
	51-2649	C-119—465th T.C. Squadron, Evreux
	WN137	Balliol T.2
23/12	17150 JM/150	R4D-8—U.S. Navy, Hendon
	WG558 R-B	Shackleton MR.2—Gibraltar
24/12	KP221 NM-221	Dakota—R.C.A.F.
	55-291	VC-131D—3rd Air Force, Northolt
28/12	53-7838	C-119—11th T.C. Squadron, Dreux, France
	53-7828	C-119—10th T.C. Squadron, Dreux, France
	44-83511	SB-17G-85-DL—57th A.R.S., Lajes, Azores
	44-35500 (BC-500)	RB-26—42nd T.R. Squadron, Spangdahlem, Germany
	43-48673	C-47—MAAG, Oslo, Norway
29/12	42-24304	C-47—MMAG, Portugal

Croydon

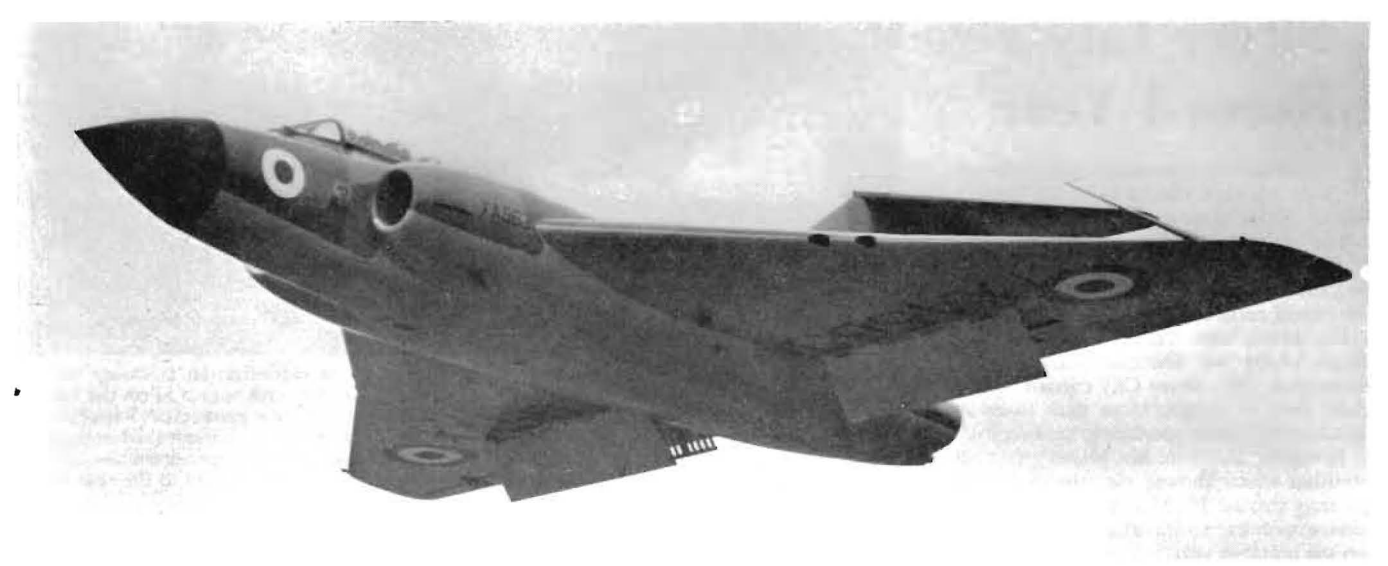
5/12	G-AHAA	Mercury—(c/n. 6268); F. G. Miles Ltd., Shoreham
[6/12	D-EDOR	Tiger Moth—ex-G-AOEW, NM211; first flight
	G-ABWP	Spartan Arrow—(c/n. 78); R. P. Green & Partners
[8/12	G-AFWM	Taylorcraft C-2—Tiger Flying Club
	VP974	Devon—(c/n. 04228); flown in from Leavesden
9/12	G-AOGB	Tiger Moth—ex-T5373; first flight
	G-AIDL	Rapide—ex-TX310 (c/n. 6968); Fox's Glacier Mints
10/12	G-ACHP	Avro Cadet
12/12	G-AHMP	Proctor I—ex-BV631; de Havilland Engine Co.
16/12	G-AKZP	Rapide—ex-NR806
	G-AMYW	Dakota—ex-44-76688 (c/n. 16472); Hunting Clan; now stripped of all paint
	G-AKJS	Rapide—Fairey Aviation Co.
20/12	PH-UBX	Expediter
23/12	G-AHKO	Taylorcraft Plus D—ex-LB381 (c/n. 180)
	ZS-DKI	Viking—Trek Airways; engine change
	G-AJZH	Hawk Trainer III—(c/n. 1641); Denham Flying Club
	OO-SOA	Tiger Moth—first flight
	WG144	Balliol T.2—R.A.F., White Waltham
29/12	G-ANWW	Anson 20—ex-VS512; flown in from Blackbushe
	G-ANLF	Dakota—ex-F-OAOR, ZS-DHO, 42-92204; Air Kruise Ltd.
2/1/56	G-ANCZ	Tiger Moth—Helicopter Services Ltd.; flown to Derby
	G-AODJ	Augusta-Bell 47G—(c/n. 044); Helicopter Services Ltd.; flown to Derby
	G-AODK	Augusta-Bell 47G—(c/n. 045); Helicopter Services Ltd.; flown to Derby

London Airport

7/12	8614	C-121—U.S.A.F. (c/n. 2606)
8/12	KP221	Dakota—R.C.A.F.
	G-ANWI	Super Freighter—Silver City Airways
	13822	C-118A—U.S.A.F. (51-3822)
9/12	VT-DHN	L-1049E Super Constellation—Air India International (c/n. 4615)
	D-AEDO	Viking 1B—DR. TIGGES-FAHTEN (ex-D-CEDO, see L.A.P. Notes, Nov. 1955)
	G-AIVF	Viking 1B—Left L.A.P. (With the exception of G-AHPR and G-AJBU, both parked fully cocooned outside the Hunting-Clan hangar, there are no ex-B.E.A.C. Vikings left awaiting disposal at L.A.P.)
	G-AODG	Viscount 736—B.E.A.C., "Fridtjof Nansen" (ex-LN-FOF)
10/12	92590	C-97A—U.S.A.F. (49-2590A)
12/12	VR-NCD	Heron—West African Airways Corp.; delivery flight (c/n. 14090)
13/12	VT-DGM	L-1049C Super Constellation—Air India International (c/n. 4548)
14/12	G-AODY	Heron—Dragon Airways
	N2047A	C-182—Israeli Air Force (formerly 45-57814, and coded CQ814)
16/12	272760	C-54D-15-DC—U.S.A.F.; radar nose, red fin and wingtips
20/12	CCCP1802	IL-12
21/12		SO-30P—coded 31S-2 (as illustrated in Photo Review, Dec. 1955)
	5556	C-54G-5-DO—U.S.A.F.; M.A.T.S. Atlantic Division
	F-BHBC	L-1049G Super Constellation—Air France
23/12	33271	C-118A—U.S.A.F. (53-3271)
	G-AMVU	Beaver
28/12	PH-LDN	L-749A Constellation—K.L.M.
	G-ANLO	Comet 3—M.o.S.; returned from round-the-world flight
30/12	G-ANBC, G-ANBD	Britannia—delivered to B.O.A.C.

Prestwick

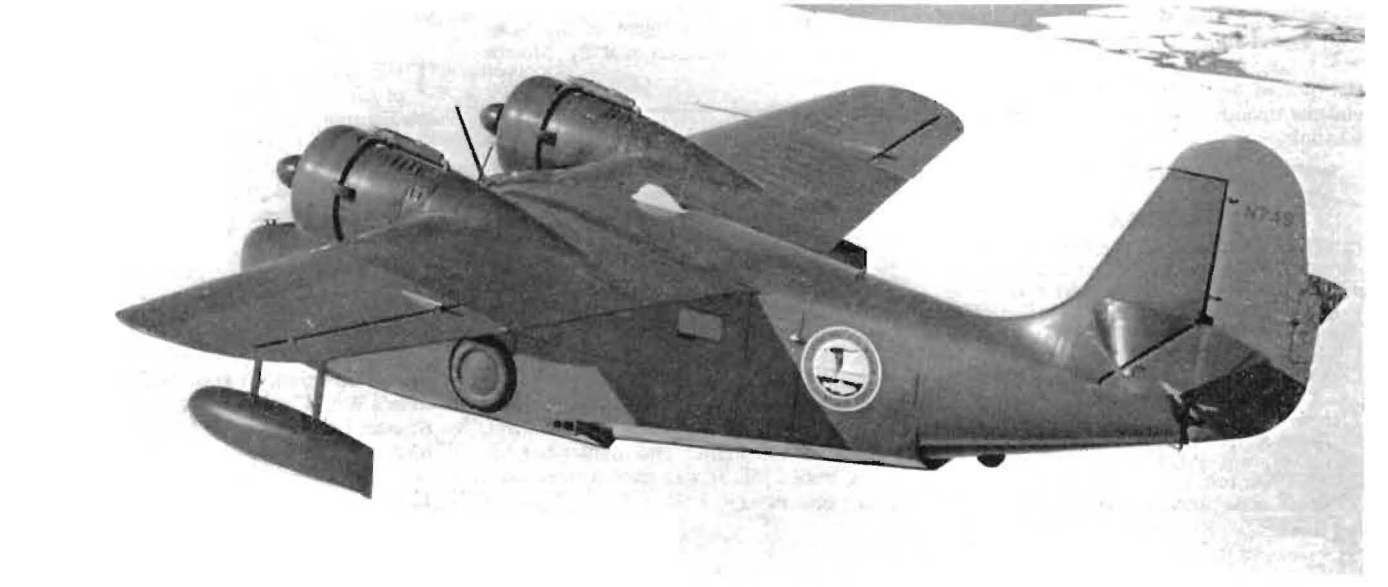
7/12	N7407	Vickers Viscount—(W) Capital Airlines; sixth delivery
8/12	0-272440	Douglas SC-54—(E) new equipment for No. 67 A.R.S., U.S.A.F.
10/12	N9927F("Steve") N9929F("Cindy")	Lockheed Lodestars—(W) Minnesota Air-motive; ex-Avicion y Commercio (Spain)
11/12	24123 (Sqdn. Code VN123)	Lockheed P2V-7 Neptune—(W) R.C.A.F.; colour, midnight blue with red Arctic Survival markings
13/12	989	Douglas Dakota—(E) R.C.A.F.; camouflaged; on delivery to European Division
15/12	0-272564	Douglas SC-54—(E) new equipment for No. 67 A.R.S., U.S.A.F.
16/12	XK370	Prestwick Pioneer C.C. Mk. I—R.A.F.; first flight
18/12	G-AOGF	Prestwick Pioneer Mk. II—Scottish Aviation Ltd.; first flight
20/12	WD500	Handley Page Hastings C.4—R.A.F.; V.I.P. transport
23/12	N7408	Vickers Viscount—(W) Capital Airlines; seventh delivery
29/12	WH920	English Electric Canberra—R.A.F.; made "dead stick" emergency landing
30/12	N9892F	Curtiss C-46 Commando—(W) Riddle Airlines Inc.; ferry flight
31/12	N7409	Vickers Viscount—(W) Capital Airlines; eighth delivery
1/1/56	N95409	Douglas DC-4—(E) Los Angeles Air Services; dark blue cheat line with red trimmings



This view of a production Gloster Javelin F. (A.W.) Mk. 1 shows to good effect the duo-taper wing leading edge and the sharp-pointed nose radome. Deliveries of the more powerful F. (A.W.) Mk. 7 will start later this year.

Rarely illustrated is the R4Y-1, the U.S. Navy cargo-transport version of the U.S.A.F. C-131 Samaritan, the latest version of which is the RC-131G. Unlike the M.A.T.S. C-131s, the U.S. Navy's R4Y-1s have the white top decking extending to below the windows.

Below: The unusual markings on the fuselage of this Grumman Goose amphibian flying over the snow-clad Northwest Territory are those of the U.S. Fish and Wildlife Service (U.S. Department of the Interior). N749 is used for waterfowl survey. (*Photo: Rex Gary Schmidt—U.S. Fish and Wildlife Service.*)



Silver City's Record Year

A BRITISH independent airline, Silver City Airways, claims to be the world's largest carrier of air cargo.

The claim was made by Mr. Eoin C. Mekie, Chairman of the British Aviation Services Group at a staff party to celebrate the parent company's 10th anniverary.

Mr. Mekie said, "In the twelve months which ended our financial year on 30th September 1955, Silver City carried 70,190 short tons of freight, more than twice as much as any other operator in the Empire."

In making the claim Mr. Mekie presented statistics which showed that the all-British air ferry carried 56,153 vehicles in the same twelve months, an increase of 32 per cent on the previous year.

Some 170 vehicles were flown in 1948, 12,124 in 1951 and 42,507 in 1954. Since the first car crossed the Channel on 14th July 1948 and up to 30th September 1955, a total of 167,655 vehicles and 449,359 passengers were flown on the air ferries.

To achieve the figures for the 1954-5 financial year the airline's fifteen Bristol 170s crossed the Channel over 23,000 times, completing more landings and take-offs per aircraft than any other commercial transport in service.

AT the request of the Iraq Petroleum Company last November a Blackburn Beverley air-lifted 129 tons of bulky oil equipment from the East Arabian port of Umm Siad to Jebel Fahud.

Prospecting for oil had indicated the possibility of valuable deposits in the desolate Fahud area, but the only practical access by land is a rough 350-mile desert track from the port of Ras Duqm. The distance from Umm Said to Ras Duqm is 900 miles by sea, and the loads must be manhandled from the ships on to desert transport.

The complete land-sea journey takes two weeks, while the air distance between Umm Said and Fahud is 365 miles—just over two hours flight. All the equipment was transported by the Beverley in nine flights, and the operation was completed ahead of schedule.

ERRATA

THE Croydon notes in the December issue of *Air Pictorial* contained a number of mistakes. The Aero Commander F-BBD7 is F-BBDY; Tiger Moth F-BHIM is F-BHIN; Tiger Moth F-BIM is F-BHIM; Tiger Moth F-BHIV was ex-G-ANJP/DE898, not G-ANPX/DE356; Tiger Moth G-ANPY was DE336, not DF336. In the January *Air Pictorial* the following mistakes appeared in Croydon notes: Tiger Moth G-ANRD was ex-N6547, not R5237; Dove ZS-DFU is ZS-DFJ; Anson TY170 is TX170; Rapide VP-KNS code number is 6492.

The U.S.A.F. has recently introduced a revised system of identification markings for fighters and fighter/bombers. Formerly the lettering *U.S. Air Force* appeared on the fin and rudder above the serial number. As this photograph of a new production Republic F-84F-56-RE Thunderstreak shows, the lettering has been removed to the front fuselage and the last digit of the contract year (52-7010) has now been dropped from the tail serial. Similarly the "buzz number" (FS-010) formerly on the nose is now to the rear of the national insigne.

INDEX FOR *AIR PICTORIAL* 1955

AN index for *Air Pictorial*, 1955, is now ready. Similar in design to the index for 1953, it has the same dimensions as *Air Pictorial* and comprises two parts. Part 1 consists of the important references to aircraft and engines throughout the year, and indicates where drawings, silhouettes and photographs have appeared. Part 2 records the main subjects covered. To keep the price as low as possible and the index to a reasonable size, all aircraft and engines are listed by manufacturers.

The index for 1955 costs 1s. 3d. (postal orders please) including postage, from *Air Pictorial* (Index), 19 Park Lane, London, W.1.

THE last de Havilland Mosquito in operational squadron service with the Royal Air Force made its final operational sortie on 15th December.

The Mosquito, a PR34-A—No. RG314—belonged to No. 81 Squadron, Far East Air Force, based at Seletar, Singapore. Its last sortie was a photographic reconnaissance flight covering a terrorist target in Malaya. With the retirement of the Mosquito, No. 81 Squadron will fly Meteor PR10 aircraft.

THE Hong Kong Auxiliary Air Force is now affiliated with No. 601 (County of London) Squadron, Royal Auxiliary Air Force. The purpose of this arrangement is to foster a close relationship between the affiliated squadrons by a regular exchange of information about training and social activities and by the extension of hospitality to members visiting each other's country.

No. 601 Squadron was formed in 1925 and was embodied for active service when war began. The Squadron served both in this country and in Middle East theatres, mainly in the fighter and fighter-bomber roles, until 1945. It was reconstituted on a peace-time basis in 1946.

New Books

"Flight Fly-Past", *a portfolio of Aircraft Photographs by "Flight" cameramen (Iliffe & Son, Ltd., 24 plates, 7s. 6d.).*

THIS portfolio of photographs will be welcomed by collectors. Some of the backgrounds tend to overwhelm the subjects, but with such outstanding photographs of the Avro Vulcan, the English Electric Canberra and the Avro Shackleton, one can find little fault with this collection.

"A Picture History of Flight", *by John W. R. Taylor (Hulton Press, 43–44 Shoe Lane, London, E.C.4, 25s.).*

THE collecting of data and information about man's conquest of the air is a hard task. To condense it and present it in a readable form is harder still.

The author of this book has done a sound job, and he provides the reader with many fascinating glimpses into the past.

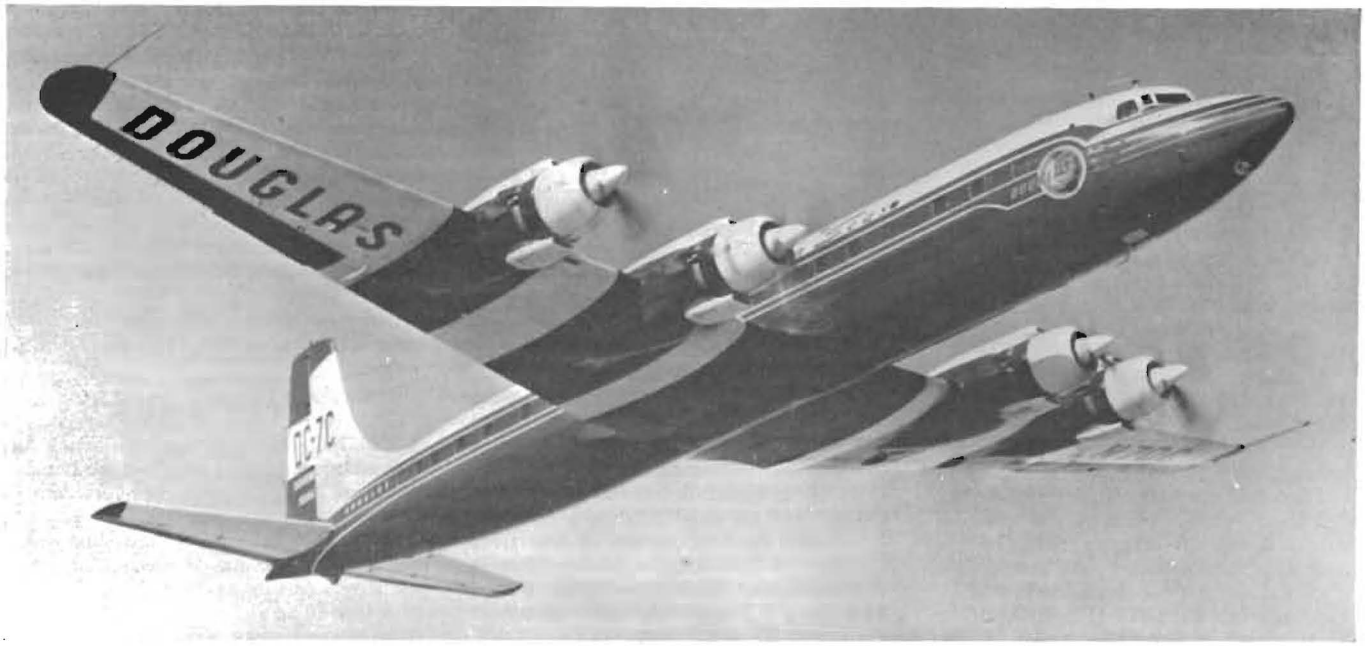
One can read about the painstaking research of the Wright brothers, the early days of R.A.E. Farnborough, and the great flights of the 'twenties.

World Wars I and II are dealt with in a competent manner, and the reader is brought up to date with a glimpse of future space travel.

THE next meeting of the London Society of Air-Britain will be held on Wednesday 8th February at 7 p.m. in the Court Room, Caxton Hall, Caxton Street, S.W.1.

The Guest Speaker will be Mr. Patrick Moore, F.R.A.S., F.B.I.S., the author and astronomer, whose subject will be "The Conquest of Space in the Light of New Developments".

HAVE a holiday abroad in comfort and with economy. This was the theme of a recent television programme called "It's a Man's World", which was presented by Air Charter Ltd. The programme demonstrated how easy it is to take a car abroad by air. No inconvenience, and Air Charter takes care of the car throughout the journey.



The first flight of the prototype Douglas DC-7C Seven Seas (N70C) took place at Santa Monica on 20th December 1955 and lasted 2 hours 45 minutes with chief test pilot Bert Foulds at the controls. The Seven Seas is designed for non-stop flights of up to 5,000 miles with 58 passengers. The wing span has been increased by 10 ft. to 127 ft. 6 in. and the a.u.w. by 14,000 lb. to 138,000 lb. Seven Seas is on order to B.O.A.C., K.L.M., Sabena, S.A.S., Swissair, P.A.A., Braniff and Northwest; also Alitalia, T.A.I. (France) and C.M.A. (Mexico).

First photograph of the Convair modified search-and-rescue Douglas SC-54D of the U.S. A.R.S./M.A.T.S. Last summer Convair began modifying thirty-six C-54 Skymasters at Fort Worth, the most noticeable features being the additional nose radome and the look-out blisters in the rear fuselage. SC-54Ds are now arriving in Europe. (See "Letters to the Editor", page 69, for more news of SC-54s.)

Still undergoing trials is the McDonnell XV-1 convertiplane. This photograph illustrates the second prototype 53-4017 (first was 53-4016), which has a number of modifications. The skid undercarriage is now bulkier and streamlined and the triangular rotor pylon has been cut down to reduce drag interference.

Letters to the Editor

AUSTRALIAN VETERANS

I READ with interest the letter from A. Parker of Australia in the December issue of *Air Pictorial*. Perhaps he and other readers interested in World War I and II vintage aircraft would like some news about the aircraft stored at Canberra.

A relative, who is War Relics Officer for the Australian War Museum, furnished the information. The aircraft are:

Avro Lancaster (G for George) which belonged to No. 460 R.A.A.F. Squadron and flew over ninety operational sorties. The first fifteen bombs painted on the nose contain a sketch of a Saint, indicating the number of strikes made by the first captain of the Lancaster, F/Lt. Saint-Smith, D.F.M. The Lancaster was flown back to Australia by returning R.A.A.F. personnel. Supermarine Spitfire II. This belonged to the famous Australian Spitfire Squadron, No. 452, and was flown by the late Squadron Leader K. W. Truscatt, D.F.C. and Bar. Messerschmitt Me 262, and a German V1 flying bomb.

The 1914-18 war aircraft are: Vickers Vimy, flown to Australia in 1919 by Ross Smith to win the Government prize of £10,000. German Albatross Scout, shot down on 17th December, 1917. Single-seat S.E.5. German Pfalz Scout, shot down during October 1918 by Australians flying Sopwith Camels. Single-engine de Havilland, flown to Australia by Lt. R. J. P. Purer and J. C. McIntosh. (The journey took them seven months.) Avro two-seat trainer. Derperdussin monoplane (early type) used as a trainer in 1914 at Point Cook, Victoria.—**J. V. Lovell, 83 Midland Road, Peterborough, Northants.**

ZAUNKOENIG

IN view of a recent report that Prof. Winter has now completed another "Zaunkoenig", your readers may be interested in this photograph of the wartime-built version still on the current British register.

This aeroplane was taken over by this Group and overhauled and repainted by two members in about three and a half months of weekend work. Now resplendent in a two-tone blue fuselage, with white separating band and white wings and tailplane, it has proved a constant source of interest at Eastleigh during the late summer. The "German Circus" chequers on the rudder are dark blue and white.

With regard to Mr. Arnold's letter on the Southern Martlet (October *Air Pictorial*), it is indeed a sorry sight, but unless anyone can find an Armstrong Siddeley "Genet", there would appear to be little that one can do, although the spirit is indeed willing.

I should be most pleased to hear from anyone with knowledge of the whereabouts of a serviceable "Genet".—**John O. Isaacs, Hon. Sec., P.F.A. Southampton Group, 42 Landguard Road, Southampton.**

Restored in all its glory, this British-registered Zaunkoenig is a credit to the owners. Thanks to reader John Isaacs for the photograph.

SPOTTING—1938 VINTAGE

AS a regular reader of *Air Pictorial*, perhaps the following notes, which I came across recently in a pre-war recognition book, may be of some interest to readers.

The writer of the notes (he may recognise them) was at Northolt on the afternoon of 8th August, 1938 and observed the following:

16.55 hrs.: 11 Gladiators of No. 3 Fighter Squadron (including K8023, K7960, K8024, K7984). Alongside there were 14 Hurricanes of No. 111 (F) Squadron. 17.40 hrs.: all-yellow Miles Magister landed. 17.50 hrs.: 12 of 111 Squadron took off in two flights of six. 18.10 hrs.: all-yellow Hawker Hart Trainer K5033 took off. 18.12 hrs.: 6 Hurricanes of 111 Squadron returned and landed in two flights of three. 19.00 hrs.: remaining 6 Hurricanes returned and circled. 19.01 hrs.: 3 Handley Page Harrows flew over. 19.03 hrs.: Hart Trainer K5033 returned and landed. 19.08 hrs.: 5 of 111 Squadron's Hurricanes returned and landed singly. 19.12 hrs.: remaining Hurricane L1145 of No. 111 Squadron landed. 19.15 hrs.: another Harrow passed over. 19.30 hrs.: Harrow circled. 19.31 hrs.: 3 Fairey Battles flew over very low. 19.40 hrs.: 6 Gladiators of No. 3 Squadron took off. 20.00 hrs.: 3 Fairey Hendon bombers flew over, escorted by 3 Hurricanes.

The following was also noted:

On afternoon of 29th July 1938, a Danish Air Lines' Focke-Wulf Fw 200 Condor named *Dania*, registration OY-DAM, landed at Croydon bringing Prince Axel of Denmark on a visit. Took off again on the following day at 09.35 hrs. and flew non-stop to Copenhagen.—**K. E. Wixey, 8 Spencer Avenue, St. Marks, Cheltenham, Glos.**

(*After the invasion of Denmark OY-DAM came to England and became G-AGAY.*—ED.)

R.A.A.F. SERIALS

I FOUND Bruce Robertson's article on Australian military serials in the January issue of *Air Pictorial* of considerable interest, but I am sorry that he has not explained a peculiarity of the system which has long puzzled me. It seems that, when the Royal Australian Navy buys machines of a type in service with the Royal Navy, these aircraft carry serial numbers in the standard British R.A.F./R.N. sequence—e.g. Sea Furies, Gannets—whereas other machines—e.g. the Autocars bought recently—are serialled in the standard R.A.A.F. system. Presumably this difference is related to some difference in the arrangements by which the various types are procured, but it seems rather liable to confuse both the Australian and British naval allocation systems.

There is one odd feature about one of the "A numbers". A30-1 to A30-4 were DC-3s, impressed early in the war from A.N.A. and returned later (they were actually VH-UZJ, -UZK, -ABR, and -ACB respectively). Then A30-5 to -14 were allotted to DC-2s bought from Eastern Airlines for use at signallers and navigation training schools. Having thus complicated the system by using the same number for two types, the R.A.A.F. made it even worse by issuing A65 for the Lease-Lend Dakotas, which one would expect to be grouped with the DC-3s.

One other machine mentioned interests me—the Northrop Delta A61-1. Can anyone say whether this was the machine used in 1938 by Lincoln Ellsworth on his last Antarctic expedition? The Australian Government bought all his equipment, including his ship, the "Wyatt Earp", and the Northrop Delta and Aeronca aircraft, when he returned to Australia early in 1939. It is known that A61-1 was VH-ADR, c/n. 42, previously NC14267.—**J. A. Bagley, 37 Bristol Road, Birmingham, 5.**

THAT XD759 SABRE AGAIN

IN *Journal of a Roving Spotter*, in the October *Air Pictorial* the serial number of the Fairey Jet Gyrodyne, originally XD759 is mentioned as having clashed with that of a Sabre 4.

I should like to remark that all Canadair Sabre 4s supplied to the R.A.F. have serials in the XB series, from about XB530 to

XB 990. The majority of aircraft with XD seem to be Vampire T.11s. I have never seen any Sabres XD.

On my own unit here, we had a couple of aircraft whose serials caused slight misunderstanding. A Sabre 4 XB536 and Vampire T.11 XD536.—**Sgt. R. W. Elliott, Sergeants' Mess, R.A.F. Geilenkirchen, B.A.O.R.1.**

(*If Sgt. Elliott will look up his filed copy of the November* 1954 (*Vol. XVI, No.* 11) *issue of* Air Pictorial, *and turn to p.* 330 *he will find photographic evidence of an R.A.F. Sabre XD*759.—ED.)

HUNTER REFUELLING—I

THE letter from Mr. F. H. W. West in *Letters to the Editor* in the November issue of *Air Pictorial* prompts me to recall an incident I witnessed towards the end of June, 1954.

I observed a Hawker Hunter F. Mk. 1 going through the actions of refuelling from a Fairchild C-119F Packet. I thought this rather strange as I had not heard of then, or now, references to experiments with Packets with refuelling equipment.—**B. Sykes, 126 Surbiton Hill Park, Surbiton, Surrey.**

HUNTER REFUELLING—II

IN the November issue of *Air Pictorial*, reader F. H. W. West of Sawston, Cambridgeshire, claims to have observed Hawker Hunters apparently refuelling from a Boeing KC-97G.

Not infrequently I have observed a Republic F-84F Thunderstreak taking on fuel from a KC-97 with as many as four Thunderstreaks in attendance.

Surely the flight refuelling gear of the Hunter is not of the Boeing rigid-boom type employed by the KC-97G? Could it have been Mr. West's identification is at fault?—**J. R. Tuller, 26 Council Houses, Ness Road, Burwell, Cambridgeshire.**

(*Mr. Tuller makes an accurate observation.* —ED.)

508's LAST JOURNEY

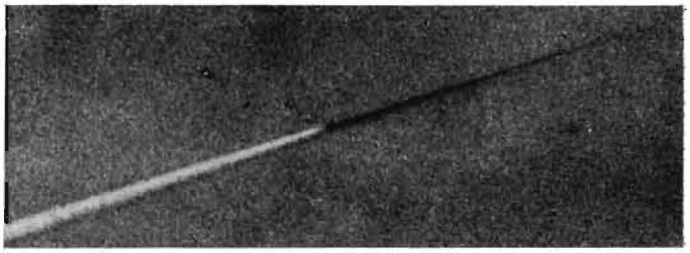
ON a recent visit to Blackbushe I was fortunate enough to log and photograph a varied and interesting array of Vikings in Eagle Air Services maintenance area and hangar.

Among the Vikings present were all four aircraft for the Argentine Government, serialled T-90 to T-93 inclusive. These looked workmanlike lined wingtip-to-wingtip, with props "trued", etc., and presumably awaiting delivery. Next, two aircraft with identical colour schemes but of different companies; one (G-AIVI) had Luft-transport Union painted above its windows, and the other (-IVJ) had Overseas Aviation inscribed in the same place. All colouring was in dark blue on both. Another Viking was inscribed Dr. Tigges-Farhten, and with Karl Herfurtner-Dusseldorf on nose (aircraft so painted have frequented L.A.P. recently, see November issue, "L.A.P. Notes"). This aircraft was G-AJBX. Finally, two aircraft presumed newly out of cocoon from L.A.P., namely G-AHPP and G-AJBP.

During this visit a P2V of the U.S.N. arrived, and I was surprised to see that it was designated P2V-5JF, which type I had never heard of before. Comparing it with a normal -5F, it had no upper turret, no second "bump" under the fin, different-shaped wing tanks BOTH containing radar, an "egg" above the cabin, and a slightly different-shaped main radome. It bore an early serial for any Mk. 5, 124900. Code was TH/9.

The Supermarine 508, VX133, which I saw at Blackbushe several weeks ago was being transported to a breaking-up yard, for the wings and tail unit were crudely cut off. —**C. Peter Smith, The Cottage, Nunhide Lane, Theale, Berks.**

This Supermarine 508 was spotted on the way to the breakers' yard by reader C. P. Smith, who sent the photograph.



This photograph taken by reader L. Anderton, shows a contrail formed by a Valiant and the projecting shadow of the contrail.

"BLUE PENCIL" EVIDENCE

WITH reference to the letter "In the Sky" published in the December issue of *Air Pictorial*, the dark band described appears to be the shadow of the contrail cast on a uniform layer of thin cloud, probably cirro-stratus. The aircraft, to give the effect, would be flying higher than the layer of cloud, but the cloud is so diffuse that the contrail and aircraft would be seen through it.

The position of the dark band relative to the contrail, as viewed by an observer on the ground, depends on a number of factors. These are: the height of the aircraft above the cloud layer, and the position of the sun and observer relative to the aircraft. If one experiments with an electric light (the sun), a pencil (the contrail), and a sheet of thin paper (the cloud) the subject is easily understood. It can be seen from this experiment, that with certain combinations of these variables the shadow can appear to project in front of the head of the contrail and lie along the same axis.

The fact that the shadow may be seen against a blue sky, as described by Mr. Fox, is possibly due to the shadow forming on the top of the uniform top surface of heat and smoke haze which is often present on calm days. This surface is quite a definite flat boundary, and is often seen from the air, especially in the neighbourhood of big towns, and it is conceivable that it could be dense enough to show a shadow on it.

I recently photographed a contrail produced by a Valiant, showing the shadow projecting in front of the head for some distance. It can be seen that the shadow tapers off in exactly the same manner as the contrail, and also the edge of the shadow is just apparent running along the port side of the contrail.—**L. Anderton, 47 Crownstone Court, Brixton, S.W.2.**

A.R.S. SKYMASTER

REFERRING to the Douglas SC-54 Skymaster (0-272521) listed in the December *Prestwick Airport Visitors*, the following additional notes may be of interest.

I understand that these SC-54Ds have been specially converted for long-range air sea rescue duties by Convair in the United States. These "Search" Skymasters are replacing the locally-based Boeing SB-29 Superfortresses of the 67th Air Rescue Squadron, U.S.A.F. Another SC-54 (of the 67th) is 0-272456.

The nose radome bulges to give a distinct kink on the underside. The familiar yellow, black-bordered identification band of A.R.S. appears just forward of the tailplane on the fuselage and also covers the forward part of the fin fillet. The word "Rescue" appears half way up the fin and rudder on a horizontal band of yellow and black. The largeast rodome blisters, roughly the same diameter as the gun sighting blisters on a Convair B-36 are on each side of the rear fuselage. The forward blister is in line with the rear cabin portholes while the rear one is aft and below this line. Between them is the U.S.A.F. star and bar insignia.—**Douglas L. Ronald, 22 Craigpark Avenue, Prestwick, Ayrshire, Scotland.**

(*Continued overleaf*)

Letters (*Continued from previous page*)

STRAIGHT OR CURVED?

I WONDER if any readers can shed some light on the style of military crosses used on German Fokker D.VIIs in World War I. I have been informed that at the time the D.VII went into squadron service the curved ("Iron") cross had been superseded by the straight-sided cross. However, I have seen photographs with the older type of cross painted on a D.VII.

Can anyone settle the exact shade of red used on Baron Manfred von Richthofen's Albatros D.III—variously described as "Post Office" (Pillar-box) Red; Scarlet and Crimson?

Finally, can someone oblige me with authentic squadron markings and serials (and their exact positioning) for a Sopwith 2F1 Camel. I am constructing a 1/48th scale model and would like to identify the Camel with one of the famous fighter pilots who was associated with it.—**J. L. Geary, 60 Tantobie Road, Newcastle upon Tyne, 5.**

PRESERVE THE PAST

I WISH to say a few words about the letter headed "Smithsonian Visit" which was published in the December issue of *Air Pictorial*.

My use of the term "stored away safely", referring to the Pfalz D.XII, has been challenged, and in reply I will give a brief background on this aircraft, and leave readers to draw their own conclusions.

The aircraft was found, crated, when the film "Dawn Patrol" was being planned. It was rebuilt by the owner, L. C. (Buck) Kennel, and was successfully flown. In the course of the next few years the aircraft deteriorated considerably, until it was rescued by Harry Provolt, who restored it. It passed to the Smithsonian shortly afterwards.

One must expect an aircraft nearly forty years old to be somewhat moth-eaten and dusty and I think we must be grateful that the Pfalz is still here at all, and has not been written off long ago.

The conditions under which the aircraft now exists are by no means peculiar to the Smithsonian. Few of the museum-owned 1914-18 aircraft are displayed in suitable conditions, and until new accommodation can be found for them, this state of affairs will persist. The Australian War Memorial collection, War Trophies Board (Canada) collection, and several aircraft in England are all stored because of this.

Lack of suitable display space, however, is no excuse for the destruction of historical aircraft or parts. I am continually hearing of old aircraft being deliberately smashed up, and a recent case comes to mind.

An enthusiastic American was on the track of a Fokker D-VII, and managed to trace it, but arrived on the scene within hours of its having had a lorry driven over it several times. The one spark in this gloomy picture is that he managed to salve the engine before it was beaten into ploughshares, or whatever people do with Mercedes engines.

I will add my appeal to that of Mr. Ord-Hume and ask all readers who know of *any* old aircraft to make every effort to see that they are not destroyed in this manner, or in any other. After all, the people of tomorrow have a right to see what yesterday and the day before were like.

I enclose a photograph taken this year by my friend, Frank Hartman of Charlottesville, U.S.A., showing the Smithsonian Fokker D-VII in rather cramped but nevertheless safe surroundings.—**Frank Yeoman, 31 Oban Avenue, West Hartlepool, Co. Durham.**

One of the few remaining Fokker D-VIIs, which is on display at the Smithsonian Museum in America.

BELLATRIX REMAINS

WITH reference to F-WALY, the S.N.C.A.S.O. S.O.30-N mentioned in your feature *Foreign Registrations Identified* (November *Air Pictorial*) readers may like to know that this prototype, called the Bellatrix, was dismantled some years ago. The remains of the fuselage bearing the letters F-WALY may still be seen at Paris-Orly Airport. The S.O.30-N Bellatrix had a short life but in a modified form is to be seen today as the S.O.30-P Bretagne. (*See photograph of a French Navy Bretagne in December* 1955 'Photo-Review—*Ed.*)—**J. B. Prudhommeaux, 26 rue des Fossés St. Jacques, Paris 5eme., France.**

STILL MORE FATES

I WAS very interested in Mr. T. N. Simpson's letter (November *Air Pictorial*) on aircraft types seen at Technical Training Schools during the war.

Like Mr. Simpson, I trained as a rigger in 1940. I was at the No. 1 School of Technical Training at Halton and whilst I was there I made a list of the interesting types seen there:

Prototype Armstrong Whitworth A.W.23 (bomber-transport) broken up; Hawker types, including a Hector K2434 (Napier Dagger), Audax K5082, Demon K5463, Fury K2048 and Hart trainer J9934; Vickers Vildebeeste and Wellesley; Boulton Paul Overstrand; Gloster Gauntlet K4638, two Bristol Bulldogs and two Westland Wallaces K4017 and K5032.

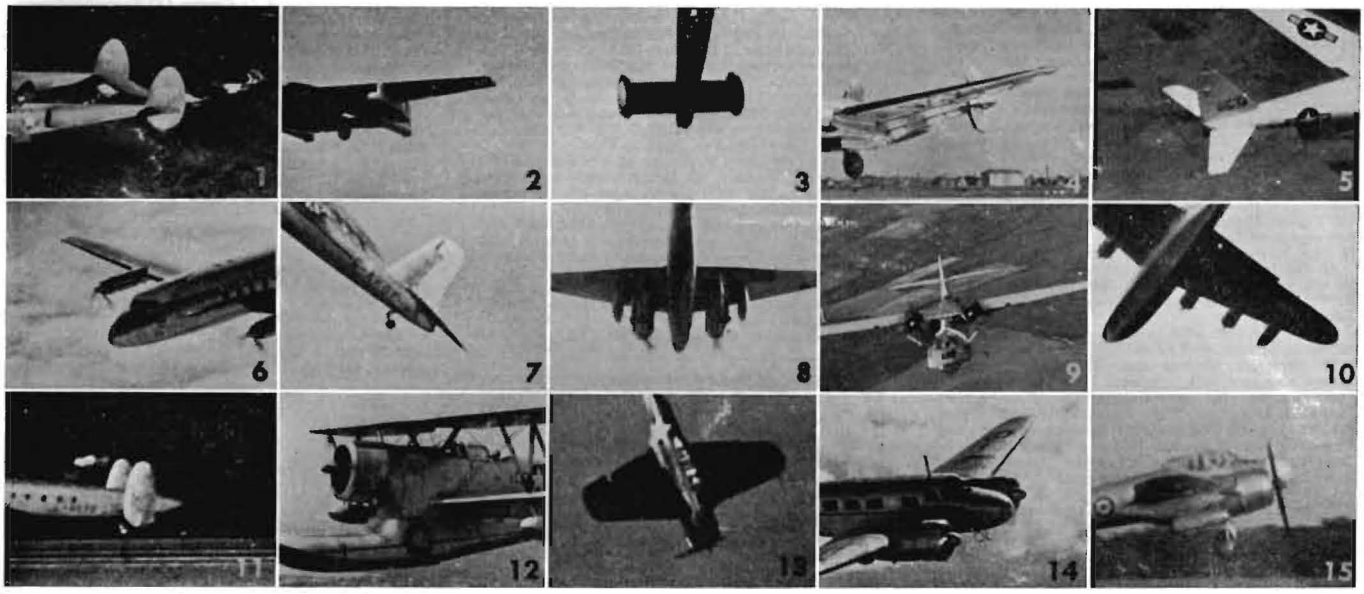
There was also the little-known Marendaz Trainer, finished all red and registered G-AFZX. This open, tandem two-seater was later resprayed all-silver and given to a local A.T.C. unit. The Trainer (*not to be confused with the earlier Marendaz Mark* 3, *G-AFGG, see August* 1955 Air Pictorial *p.* 249—ED.) had a low, cantilever wing with an exceptionally wide, fixed undercarriage. Construction of the Trainer was all wood, the engine, a 90-h.p. Cirrus Minor. The 34-ft. span wing had (Marendaz) built-in wingtip slots. All-up weight was 1,500 lb., and maximum cruising speed was 95 m.p.h.—**N. Nugent, 2 Crossways, Jaywick, Essex.**

(*The Armstrong Whitworth A.W.*23 *was the forerunner of the wartime Whitley. Built to a* 1931 *Air Ministry Spec.* (*C.*26/31), *the one-off A.W.*23 (*K*3585) *first flew on* 4*th April* 1935 *powered by two* 810-*h.p. Armstrong Siddeley Tigers driving four-blade, wooden, fixed-pitch airscrews. Later three-blade, metal, Hamilton controllable-pitch airscrews were fitted. Planned to seat twenty-four, the A.W.*23 *had a crew of four. Originally the A.W.*23 *was projected with a high-wing layout. The low-wing was eventually adopted to permit a retractable undercarriage. The A.W.*23 *was in competition with the Handley Page H.P.*51 (*also unsuccessful*) *the precursor of the Harrow, and the Bristol Type* 130; *respectively J*9833 *and K*3583. *The Type* 130 *became the Bombay which secured the bomber-transport contract.* —ED.)

PROOF WANTED

HAS any reader of *Air Pict...* definite proof that the photographs of the famous German ace of World War I, Ernst Udet, shown on pages 88-89 in his book *Mein Fliegerleben*, published in 1935 by Ullstein, is that of his Fokker D.VII? This Fokker D.VII is so unusually decorated with wide candy stripes on the upper main wing, at least a three-toned empennage, and the words "Du doch nicht" painted on the elevators, that it should be easy to identify the pilot who flew it, yet I've heard conflicting claims as to whether or not Udet actually used it in combat.—**Edgar Deigan, Box 958, New Rochelle, N.Y., U.S.A.**

Heads and Tails (Answers on page 72)



BRITISH REGISTRATIONS IDENTIFIED

by F. A. Hudson, British civil register specialist of Registration Research

G-AAJH	D.H.66 Hercules, "City of Basra" (c/n. 393); Imperial Airways; sold abroad 1934
G-AAJP	D.H.60G (c/n. 1123); impressed 1940
G-AAPJ	D.H.60X (c/n. 1173); crashed 16/8/36
G-AARY	D.H.66 Hercules, "City of Karachi" (c/n 703); crashed 18/12/35
G-ABCP	D.H.66 Hercules, "City of Jodhpur" (c/n 1347) crashed 23/11/35
G-ACCV	D.H. Dragon (c/n. 6014); flew Atlantic 21-22/7/33 and crashed on landing at Bridgeport, Conn.
G-ACJM	D.H. Dragon (c/n. 6049); crashed at Hamble 12/8/34
G-ACRK	Fox Moth, "Robert Bruce" (c/n. 4090); sold abroad 1935
G-ADUS	Lockheed Altair 8D (c/n. 152; ex-N118W and VH-USB); crashed 8/11/35
G-AECZ	D.H. Dragon (c/n. 6105); impressed as AV982, restored and later sold as EI-AFK in 1950
G-AENV	Pou de Ciel (c/n. HM18); sold abroad 1937
G-AEPC	Bellanca 28-90 (c/n. 902; ex-EI-AAZ); registration cancelled
G-AFFI	Registration not allotted
G-AGOS	Reid & Sigrist Desford (c/n. 3); Reid & Sigrist Ltd.; now VZ728
G-AIDJ	Aerovan 4 (c/n. 6387); crashed at Baghdad 30/11/48
G-AJPM	Skymaster (c/n. 10376; ex-42-72271, PH-TBS and NL314); Skyways Ltd.; sold as F-BELS
G-AKHF	Aerovan 6 (c/n. 6399); sold as I-VALK 1954
G-AKLM	Sealand 1 (c/n. SH1562); Short Bros. & Harland Ltd.; crashed in Norway 15/10/49

FOREIGN REGISTRATIONS IDENTIFIED

by F/Lt. D. A. S. McKay, D.F.M., overseas civil register specialist of Air Britain

AP-ABO	D.H.83C Fox Moth (c/n. F.M.42); F/Lt. W. Banach
EC-AEJ	DC-3 (c/n. 9344, ex-42-23478); IBERIA
F-BEIJ	DC-3 (c/n. 15806, ex-44-76222); Sté. Marcel Dassault
F-BFYS	Auster Autocrat (c/n. 1844, ex-G-AGVK); Club Aér. de l'Arondissement de Bernay
F-BGLO	Jodel D.111 (c/n. 75); converted to D.112; Groupe Aér. Colonel Thenault
F-BGKR	C.A.B. Minicab (c/n. A132); Aéro-Club de Joigny
F-PGIO	C.A.B. Minicab (c/n. A148); Aéro-Club de Sens-Montéreau
F-VNBL	DC-3 (c/n. 20184, ex-43-15718); Service Impérial des Liaisons Aériennes
HB-EAS	Fairchild Argus 2; G. Furrer
HB-EVA	Bücker Jungmann; Dr. A. E. Scotoni
HB-COK	Cessna 170B (c/n. 26445); Section Genève de l'Aéro-Club Suisse
HB-IKO	Comte AC-4 (ex-CH-262); A. Kammacher
HB-EMI	Fairchild Argus 2 (c/n. 767, ex-FZ827, 43-14803); Messrs. Stuber & Trub
HB-MIH	Bücker Bestmann (ex-U-83); Section Vaudoise de l'Aéro-Club Suisse
HB-ODG	Piper Cub (c/n. 12984, ex-44-80688); Balair AG
HB-OER	Piper Cub (c/n. 12595, ex-44-80299); Pierre Baumgartner
HB-OOF	Piper Clipper; Essor-Wyder & Cie.
HB-OOT	Piper Super Cruiser (c/n. 12-2381); Section Genève de l'Aéro-Club Suisse
HB-OMU	D.H. Moth-Minor (c/n. 94020); Cercle Aérophile Genève
HB-OSM	Piper Cub (c/n. 12252, ex-44-79956); Section Vaudoise de l'Aéro-Club Suisse
HB-OTA	D.H. Leopard Moth (c/n. 7007, ex-CH-366); Section Vaudoise de l'Aéro-Club Suisse
HB-UPE	D.H. Moth-Major (c/n. 5078, ex-CH-348); Section Vaudoise de l'Aéro-Club Suisse
I-COLJ	Agusta P.110 (c/n. 012); Societa Italasbesto
I-VIRT	Piper Clipper (c/n. 16-476); Aero Club di Perugia
OO-IAC	Stinson 108-2 (ex-OO-JAC); J. Cousin
OO-JAC	Beech Bonanza; J. Cousin
OO-JPB	Ercoupe 415CD (c/n. 4777, ex-LX-JPB); Club National d'Aviation
OO-SNC	DC-3; Etat Belge, Ministère des Communications
SE-ACK	Junkers F13ke (c/n. 2069); A. Ahrenberg; sold to Finland in 1940
ZS-BCA	DC-3 (c/n. 13182, ex-42-93287); Anglo-Vaal Air Transport; sold to U.K. as G-AJDE, thence to Kenya as VP-KGL; resold to South Africa as ZS-DBV, and finally returned to U.K. as G-AJDE of British European Airways
ZS-BCY	DC-3 (c/n. 13014, ex-42-93136); Field Aircraft Services (Africa) Ltd.; sold to Yugoslavia as YU-ACC
ZS-BCZ	D.H. Tiger Moth (c/n. 84753, ex-SAAF 2168, R.A.F. T6379); Albatross Aviation Industries; broken up 1951

INFORMATION WANTED

Serial numbers of British military aircraft from VA onwards.—A. W. Bulloch, 38 Southfields Park, North Harrow, Middlesex.

Photographs, serial numbers, details, etc., of the English Electric Canberra.—D. A. Fagg, 82 High Street, Hampton Hill, Middlesex.

Serials, ex-registrations, construction numbers and fate of British aircraft from G-AAA to G-AMZZ no longer on British civil register.—C. J. Dott, 327 Aigburth Road, Aigburth, Liverpool, 17.

Information wanted on the whereabouts of the LO49E Constellations sold to the U.S.A. in exchange for the L749A Constellations.—D. J. Barr, P.O. Box 62, Auckland, C.1, New Zealand.

Details of markings and colour scheme of operational Heinkel He 51 biplane fighter.—P. C. Kirby, Rose Cottage, Braunston, Nr. Rugby, Warwickshire.

Previous registrations, owners, etc., of the following Dakotas: F-OAOR, F-OAIF, G-AHCT, G-AMPP, OH-VKR, G-AMPO, CF-ILZ, G-AMYB, G-AMYV, G-AMYX, WN-IAS, SN-AAH, YU-ACD, G-AMSS, G-AMSU, G-AMVB, G-AMVC, G-AMFV, ZU-I6 and 17 (Dutch Air Force).—D. H. Cotterell, 133 Beech Lane, Lower Earley, Nr. Reading, Berkshire.

WANTS, DISPOSALS AND EXCHANGES

Wants

Air Pictorial, 1950, 1951, 1952; complete set of the *Aeroplane Spotter*; all copies *Observer's Book of Aircraft*. Will buy or exchange. S.A.E.—B. W. Ellis, 9 Claudius Road, Colchester, Essex.

Correspondents in Sweden and Norway. Subject: Military Aviation.—H. J. v. d. Brink, Goedestraat 60, Utrecht.

Recognition manuals, booklets or magazines on German World War II aircraft; any condition. Also any photos, cuttings, silhouettes, etc., on German jet and rocket projects. State prices.—P. E. Garvey, 19 Alworth Road, Nr. Blackley, Manchester, 9.

Aeroplane Spotter, No. 211, required, also indexes to Vols. VII and IX.—B. Cox, 7 Avenue Road, Christchurch, Hants.

L'aviazone austro ungarica zulla Fronte italiana, 1915-18, by Riccardo Cavigioli.—G. Haddon, 8 Gloucester Grove, Burnt Oak, Edgware, Middlesex.

Book of Bristol Aircraft, good condition. Best price paid.—K. S. West, 1026 Wimbourne Road, Moordown, Bournemouth, Hants.

Model Airplane News (1934-35) containing articles on the development of the Fokker fighters by R. C. Hare. Also similar articles on Albatros fighters by J. Nieto.—P. L. Gray, 44 Abbotswood Road, Luton, Beds.

Information

Details of Junkers Ju-89 heavy bomber, dimensions, 1/72nd scale plans, silhouettes, etc.—D. L. Barwick, 13 Knights End Road, Great Bowden, Market Harborough, borough, Leicestershire.

Serials and photographs U.S.A.A.F. aircraft and U.S.N. carrier planes in return for data, silhouettes and photos, some eight by ten inches, of Japanese, German and British airplanes of the 1939-1945 air war.—K. A. McLean, 185 Lanark Street, Winnipeg 9, Manitoba, Canada.

Serials of Sunderland Code A:A, Provosts Codes T:B and U:O, Balliol Code A:M, Meteor Mk. 7 codes 12, 21, 25, 56, 68, Identity of serial VR574.—T. Hancock, 33 Fydell Street, Boston, Lincs.

(Continued overleaf)

WANTS, DISPOSALS, ETC.

(*Continued from previous page*)

Disposals

Aircraft of the Fighting Powers, Vols. I-VII; the books of *Bristol*, *Miles* and *Westland Aircraft*; *British Aircraft*, Vols. I and II; *Aircraft of the U.S.A.*, Vol. I; *Camouflage, 1914-18 Aircraft*; *A.T.C. Gazette* and *Air Pictorial*, Dec. 1942-April 1950; *Ships of the Royal Navy*; *Ships of the U.S.N.*; *Ships of the World's Battlefleets, 1942*; *World's Warships, 1942, 1944 and 1948*; and *Jane's Fighting Ships, 1943, 1944-45*. All in good condition. Offers to: A. Bartram, 38 Deanhill Road, East Sheen, London, S.W.14.

R.A.F. Flying Review, 1954-55; eight Ian Allen Recognition books; *Flight*, 1953-54, twenty-two copies.—B. W. Ellis, 9 Claudius Road, Colchester, Essex.

Aircraft of the Fighting Powers, Vol. VI; *The Aeroplane*, 100 copies; *Flight*, 116 copies; *Book of the Hurricone*; few copies of *Air Reserve Gozette* and *Air Pictorial*.—N. Farr, Haywood, Callon, Hereford.

Air Pictoriol, Oct. 1953-July 1955; also twenty-eight aircraft books and magazines. Offers, with S.A.E.—R. Tricker, 61 Harestone Valley Road, Caterham, Surrey.

Air Pictorial, Dec. 1953 to date.—C. King, 32a Sunnyhill Road, Streatham, S.W.16.

The Aeroplane, 1944 to date.—D. A. Fagg, 82 High Street, Hampton Hill, Middlesex.

Air Pictorial, 1953, 1954 and 1955, complete, except Jan. 1953, £1 secures. *Flight* and *Aeroplane*, containing S.B.A.C. reports 1953 and 1954, twelve magazines, and *Observer's Book of Aircraft*, 1953 and 1954, 10s.—M. B. Gentry, 142 Ongar Road, Chelmsford, Essex.

Air Reserve Gazette Aug. '45 to Aug. '55. *The Aeroplane* Aug. 1945 to June 1950. *Aeroplane Spotter* No. 141 to 217. Enquiries.—B. Fenn, 386 Old Road, Clacton, Essex.

Air Pictorial Oct.-Dec. '53; Jan.-Dec. '54; Jan.-Oct. '55. *R.A.F. Flying Review* April, May, Aug., Oct.-Dec. 1953; Jan.-Dec. 1954; Jan.-Oct. 1955. *Aeronautics* May-Dec. 1954; Jan.-Oct. 1955.—J. Burgess, 19 St. Martin's Avenue, Luton, Beds.

Aeromodeller, Sept. 1951 to Aug. 1953, unbound, *Jane's A.W.A.* 1942, clean condition.—A. Walmsley, Manor Cott., Nateby, near Garstang, Preston, Lancs.

Aircraft of the Fighting Powers, Vols. 1-6 inclusive. Offers.—H. Tyson, The Cottage, Stidham Farm, Keynsham, Bristol.

Over 3,000 assorted photographs of jet aircraft to be sold in bulk or otherwise. Also *Jet Aircraft of the World* 1955. Offers.—W. Palmer, School House, Peter Symonds School, Winchester.

Three *Jane's A.W.A.* 1948, 1949-1950, 1950-51, and a complete set of *Aeroplane Spotter*. Offers.—D. Pay, 286 Lower Woodlands Road, Gillingham, Kent.

Flight 15/5/53 to 19/11/55, *Air Pictorial*, May '52 to Oct. '55, excluding Aug. '52, etc., also *Aircraft Recognition Manual* by C. H. Gibbs Smith, *Observers Book of Aircraft* 1952, 1953 and 1955. A.B.C. Booklets—*Military Aircraft Recognition* 1953 and 1954, etc.—B. Mills, 95 Batchmere Estate, Birdham, nr. Chichester, Sussex.

Westland Book of Aircraft, *Aeromodeller* May 1953-Jan. 1955 and March 1955, *Flight* 1954-55, *Air Pictorial* Dec. '52-May '53. Aircraft photos (from magazines) mounted on cards, approximately 2,000, S.A.E. for details.—J. Ward, 89 Askham Lane, Acomb, York.

Six copies *Aeroplane Spotter* for each of the following *Air Pictorials*: '53, Jan.; '52, Jan., April and Aug.-Sept., or will pay 1s. 6d. each and postage.—V. G. White, 42 Larch Avenue, Bramley, Rotherham.

Flight (70 misc. copies) ranging from 23rd April 1953 to 4th March, 1955, in exchange for any *Jane's A.W.A.* preferably war-time, or any *Observer's Books of Aircraft*, 1939-45 or earlier.—Michael J. Mason, 11 Lisle Grove, High Howdon, Wallsend-on-Tyne, Northumberland.

The Complete Flying Course by N. Roy Harben, D.F.C., published by C. Arthur Pearson Ltd.—L. F. Drury, 23 Strathmore Drive, Crosby, Liverpool, 23.

Exchanges

Exchange 250 1/72nd scale, three-view aircraft drawings (1914-40 period) and one copy of *Japanese Aircraft*, for detailed structural drawings of Savoia-Marchetti S.M.93.—B. D. Cossar, 132 Tutanekai Street, Rotonua, New Zealand.

R.A.F. Flying Review, Sept. 1954 to Dec. 1955, and *Flight*, 19/8/55 to 2/12/55, for an equal number of *Flight* or *Aeroplane* between 1939 and 1945, in reasonable condition.—R. Harris, "Regina", 12 Ivins Road, Holtspur, Bucks.

Pilot's Notes (Pilot's Handbooks) for U.S. World War II military aircraft: B-24, B-26, B-32, B-29, P-38, P-39, P-51, P-61, L-4, L-16, etc., for similar handbooks of both British and U.S. World War II military aircraft. Send list.—R. M. Gerdes, 2340 132nd Avenue, West, San Leandro, California, U.S.A.

KEY TO HEADS AND TAILS

(See page 71)

1. Lockheed Lightning P-38; 2. de Havilland Vampire FB-5; 3. Convair Liberator B-24; 4. Sudouest Bretagne S.O. 30P; 5. Bell X-5; 6. Vickers Viscount; 7. Prestwick Pioneer; 8. Lockheed Ventura; 9. Convair Catalina; 10. Short Sunderland; 11. Avro Lancastrian; 12. Grumman Duck; 13. Douglas Dauntless; 14. Lockheed 10 Electra; 15. Bristol Brigand T 4.

FREE! TO AMBITIOUS ENGINEERS 144-PAGE BOOK

Full details of the easiest and quickest way to prepare for A.F.R.Ae.S., A.R.B. Licences, B.Sc.(Eng.), A.M.I.Mech.E., City & Guilds, and hundreds of Home Study Courses in all branches of Aeronautical, Mechanical & Electrical Eng., Draughtsmanship, R.A.F. Maths., etc., are given in this valuable book. Our Courses have been approved by Royal Aeronautical Society and many B.I.E.T. Students have obtained First Places in the A.F.R.Ae.S. Exams.

We definitely Guarantee NO PASS—NO FEE

A copy of this enlightening Guide to well-paid posts will be sent on request—FREE!! Write: B.I.E.T., 109 COLLEGE HOUSE, 29-31, WRIGHT'S LANE, LONDON, W.8.

BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY

R.A.F. Blazer Badges

Squadron, Royal Observer Corps and A.T.C. Badges in Silk and in Gold Wire. A.T.C. Ties.

Write for price list to:

DOMBEY & SON

99 LEADENHALL ST., E.C.3

***Air Pictorial* Binding Cases**

Ten Shillings and Sixpence each

(*Including Postage and Packing*)

From:

AIR PICTORIAL

LONDONDERRY HOUSE,

19 PARK LANE, LONDON W.1.

THE MODERN INVISIBLE AIDS TO BETTER VISION

MICRO'S. CORNEAL AND CONTACT LENSES

We will be pleased to arrange personal and confidential deferred payments.

Send for details and free descriptive booklet from

CORNEAL-CONTACT LENSES LTD DEPT. 229c.

115 OXFORD STREET, LONDON, W.1. Tel.: GERrard 2531

197a Regent Street, London, W.1. Tel. REGent 6993

Branches at CARDIFF, LEICESTER, SHEFFIELD, LEEDS, YORK, HULL, NEWCASTLE, GLASGOW *and main centres.*

MUSEUM PRESS

Space Ships

and

Space Travel

Flying Windmills

The Story of the Helicopter

by

FRANK ROSS

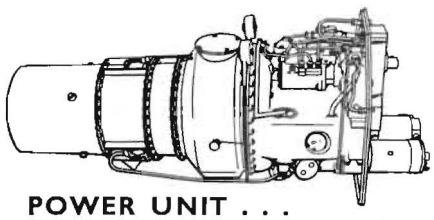
Two up-to-date books on highly topical subjects, illustrated with photographs on almost every page. Comprehensive and comprehensible.

12/6 *net each.*

MUSEUM PRESS

Published for the Proprietors, the Air League of the British Empire, Londonderry House, 19 Park Lane, London, W.1, by the Rolls House Publishing Co. Ltd., Rolls House, 2 Breams Buildings, London, E.C.4, and printed by Staples Printers Limited at their Rochester, Kent, establishment.

THE *FAIREY* ULTRA-LIGHT HELICOPTER



POWER UNIT . . .
One Blackburn-Turboméca Palouste Gas Turbine

The Fairey Ultra-Light Helicopter is a communications and observation aircraft suitable for operation in any terrain: simple, transportable in a standard 3-ton truck, economical both in fuel and skilled maintenance requirements.

It carries a crew of two and its primary functions include A.O.P., Staff transport and communications, tactical reconnaissance and traffic control.

THE FAIREY AVIATION COMPANY LIMITED · HAYES · MIDDLESEX

HUNTER F1, F4 AND F6

HUNTER TRAINER

SWIFT

SUPERMARINE N113

DE HAVILLAND 110

COMMONWEALTH SABRE

LANSEN

DRAKEN

MYSTERE 1VB AND 1VN

SUPER MYSTERE

CANBERRA

VALIANT

VAUTOUR

COMET 2, 3 AND 4

CARAVELLE

FAIREY DELTA 2

All

powered by

ROLLS-ROYCE

AVON

ENGINES

ROLLS-ROYCE LIMITED · DERBY · ENGLAND